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British Columbia

Ministry of
Energy, Mines and
Petroleum Resources

MINERAL RESOURCES DIVISION

1982
SUMMARY OF OPERATIONS

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FOREWORD

The *Summary of Operations, 1982, Mineral Resources Division* provides a review of the mineral industry, detailed statistics of its performance, and a summary of the activities of the Mineral Resources Division. These three elements--review, statistics, and operations of the Division--form three chapters that follow the format of the equivalent chapters in the *Annual Report of the Minister* in 1979. The creation of a volume, *Summary of Operations*, parallels the practice in the Petroleum Resources Division and it is intended to eventually get the data of the industry to the interested public in a more timely manner while leaving the *Annual Report of the Minister* free of details and statistics.

The evolution of yearly reports continues as the growth and diversification of industry related to mineral and fuel resources diversifies and as the Ministry reacts. *Annual Reports of the Minister of Mines* have been published from 1874. Changes in name of the Ministry occurred in 1959 to Mines and Petroleum Resources and in 1978 to Energy, Mines and Petroleum Resources. In addition, in 1969 geological and technical reports previously published as part of the Annual Report were published separately *Geology, Exploration and Mining in British Columbia*. Starting in 1975, this technical volume has been divided into separate reports that are issued as they are prepared. Detailed information on mine safety, fatal accidents, dangerous occurrences, etc., was included in the Annual Report until 1973, for 1974 was issued separately, and subsequently forms part of the separate volume *Mining in British Columbia*.

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THE MINERAL INDUSTRY IN 1982

CHAPTER 1

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SUMMARY OF OPERATIONS

REVIEW

Mineral production in British Columbia showed a second consecutive decline during 1982, reflecting falling product demand, high interest charges, and increasing costs.

The total value of mineral production (including solid minerals, petroleum and natural gas) was $2 797 million, down $212 million or 7.0 per cent, from $3 009 million in 1981.

Solid minerals were responsible for the decrease in mineral production as metals, industrial minerals, and structural materials all experienced substantial reductions in production during 1982.

The share of solid minerals declined from 70.6 per cent in 1981 to 67.4 per cent in 1982, while petroleum and natural gas accounted for 32.6 per cent of the total value of mineral production in 1982, up from 29.4 per cent in 1981.

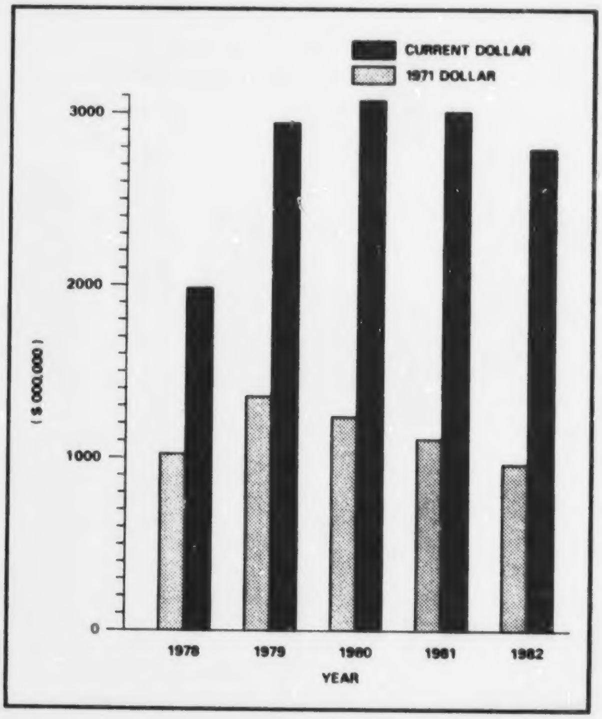

Figure 1-1. British Columbia Mineral Production, 1978 - 1982

The total value for 1982 and percentage change since 1981 for the various sectors are as follows:

	1982 VALUE $	PERCENTAGE CHANGE
Metals........................	1 057 488 380	-15.2
Industrial Minerals...........	95 644 218	-21.9
Structural Materials..........	164 156 644	-18.2
Coal..........................	566 878 240	+ 2.3
Petroleum and Natural Gas ...	912 902 555	+ 3.2
	2 797 070 037	- 7.0

Metal mines have been particularly hard hit with six major producers of copper or molybdenum closing operations at the end of 1982. Production cutbacks and losses were incurred by many other operations.

British Columbia, nevertheless, continued to be Canada's leading producer of copper, molybdenum, lead, and coal in 1982 and a major contributor to the production of natural gas, zinc, asbestos, gold, silver, and cement.

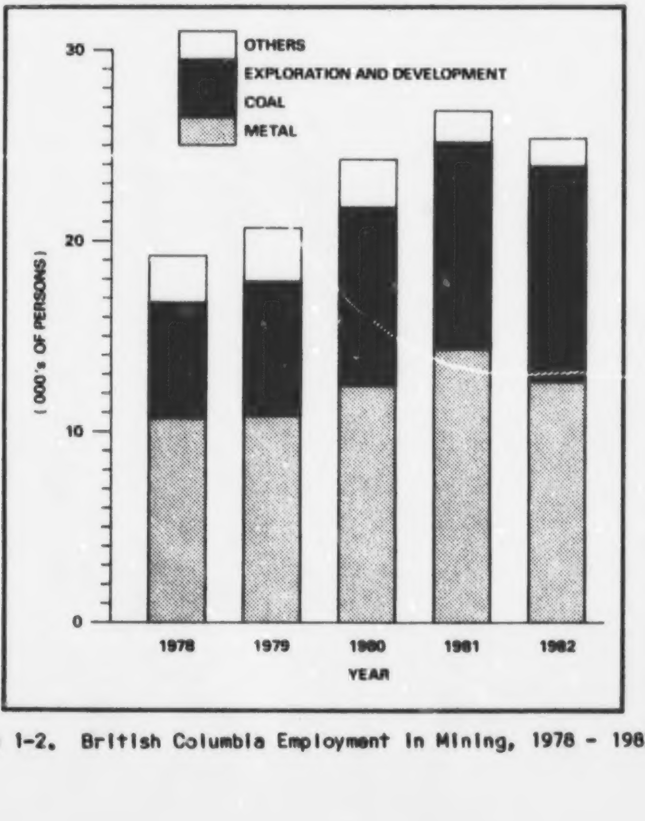

Figure 1-2. British Columbia Employment in Mining, 1978 - 1982

British Columbia producers of metals suffered limited operations due to record-low prices of principal base metal products--copper, zinc, lead, molybdenum--and continuing full production by producers, that is, Africa and South America, where production volumes of metals were sustained for foreign exchange and domestic employment regardless of the cost of production.

Higher average price contributed to a record-high value of production for coal in 1982 ($566.9 million) replacing copper and natural gas as the most valuable mineral produced in the province. Notwithstanding the improvement in relative importance, the total coal shipment decreased somewhat as a result of the world-wide recession which began to affect the international steel industry in the second half of 1982.

Natural gas ranked second in value of production during the year ($542.7 million) and copper fell to the third place for the first time ($495 million). Other major minerals in order of value of production were: crude oil, $333.9 million; silver, $158.3 million; molybdenum, $155 million; gold, $118.3 million; cement, $69.3 million; sand and gravel, $65.7 million; and zinc, $63.6 million.

Most major minerals recorded lower levels of production, except the substantial increase in production value enjoyed by petroleum products and moderate increases recorded for coal and silver.

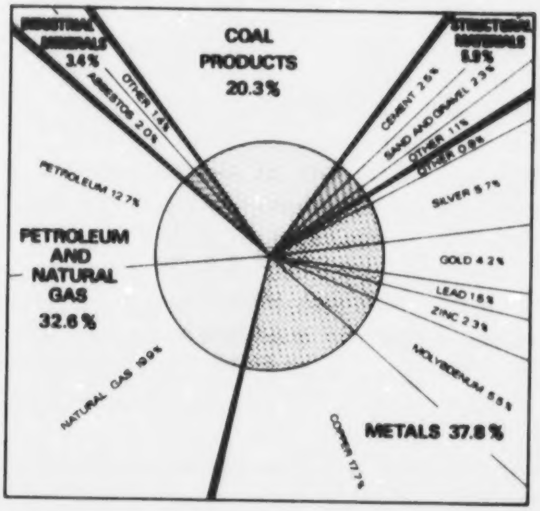

Figure 1-3. Major Mineral Commodities Produced in 1982 by Value

TABLE 1-1. MINERAL PRODUCTION OF BRITISH COLUMBIA, 1981 and 1982

		1981		1982	
	UNITS	QUANTITY	VALUE $	QUANTITY	VALUE $
METALS					
Antimony	kg	68 323	360 745	213 519	1 161 543
Bismuth	kg	47 300	102 641	27 305	83 007
Cadmium	kg	101 962	371 077	147 656	286 265
Copper	kg	290 088 241	611 282 050	279 873 599	495 009 799
Gold-placer	g	291 705	4 540 289	175 607	2 467 470
Gold-lode, fine	g	7 468 769	131 542 422	7 511 908	115 802 480
Iron concentrates	†	602 272	14 274 498	774 951	19 630 010
Lead	kg	84 854 093	61 529 276	83 746 551	43 035 587
Molybdenum	kg	12 933 224	198 240 391	14 747 888	154 990 970
Silver	g	403 754 797	152 420 716	488 906 948	158 260 320
Tin	kg	150 341	2 198 138	115 261	1 568 666
Tungsten (WO_3)	kg	---	---	104 730	1 114 350
Zinc	kg	79 214 552	67 026 535	75 182 699	63 571 545
Others	--	---	2 793 757	---	506 368
Sub-totals	--	---	1 246 682 535	---	1 057 488 380
INDUSTRIAL MINERALS					
Asbestos	†	90 914	76 770 285	76 084	57 032 422
Diatomaite	†	3 600	155 232	137	6 850
Fluxes	†	48 313	509 678	53 801	1 018 576
Granules	†	28 297	1 756 810	20 962	1 400 812
Gypsum and gypsite	†	684 924	5 804 770	415 458	5 468 093
Jade	kg	59 208	133 598	78 681	320 861
Sulphur	†	507 566	33 337 562	423 892	29 115 860
Others	--	---	3 996 907	---	1 280 744
Sub-totals	--	---	122 464 842	---	95 644 218
STRUCTURAL MATERIALS					
Cement	†	955 922	82 372 375	749 571	69 265 713
Clay products	--	---	10 292 772	---	5 853 261
Lime and limestone	†	2 659 406	9 400 205	2 575 441	10 465 577
Rubble, riprap, and crushed rock	†	3 168 694	11 100 383	2 652 976	12 898 647
Sand and gravel	†	42 361 930	87 603 864	26 702 329	65 648 899
Building stone	†	383	16 680	145	24 547
Sub-totals	--	---	200 786 279	---	164 156 644
COAL					
Coal-sold and used	†	11 752 621	554 271 292	10 645 742	566 878 240
TOTAL SOLID MINERALS	--	---	2 124 204 948	---	1 884 167 482
PETROLEUM AND NATURAL GAS					
Crude oil	m^3	2 035 953	236 170 548	2 078 258	333 892 930
Field condensate	m^3	27 871	3 233 036	20 771	3 337 069
Plant condensate	m^3	124 946	13 284 259	135 185	19 765 399
Sub-totals	--	---	252 687 843	---	356 995 398
Natural gas to pipeline	10^3m^3	8 062 681	616 795 096	7 188 561	542 664 470
Butane	m^3	84 635	9 953 076	89 443	9 436 236
Propane	m^3	64 118	5 080 069	68 783	3 806 451
Sub-totals	--	---	631 828 241	---	555 907 157
TOTAL PETROLEUM AND NATURAL GAS	--	---	884 516 084	---	912 902 555
GRAND TOTALS	--	---	3 008 721 032	---	2 797 070 037

Natural gas ranked second in value of production during the year ($542.7 million) and copper fell to the third place for the first time ($495 million). Other major minerals in order of value of production were: crude oil, $333.9 million; silver, $158.3 million; molybdenum, $155 million; gold, $118.3 million; cement, $69.3 million; sand and gravel, $65.7 million; and zinc, $63.6 million.

Most major minerals recorded lower levels of production, except the substantial increase in production value enjoyed by petroleum products and moderate increases recorded for coal and silver.

Among the top ten leading minerals produced in British Columbia, there was a surge in average unit price for petroleum, coal, cement, and sand and gravel while unit prices were lower than the 1981 level for copper, gold, silver, zinc, molybdenum, and natural gas. Copper, molybdenum, and asbestos registered the largest price reductions.

Details of mineral production during 1982 in comparison to 1981 is shown in Table 1-1. Major minerals and their proportional contributions to the total mineral production in British Columbia are illustrated on Figure 1-3. Comparisons of these figures with those for the recent year reveal significant shifts in trends and demonstrate growth and decline of specific commodity sectors since the record high levels reached in 1980.

OUTLOOK

For British Columbia metal and mineral producers, the outlook for 1983 and beyond are based on the economic forecast that show low real growth in the economy, lower inflation and lower real and nominal interest rates. These indicators may permit a recovery to begin at a slow pace in 1983-84, led by revival in the North American housing and automobile markets. If this leads to increases in business capital expenditures, the recovery would gain strength in 1984-85.

British Columbia mineral producers have responded to extremely depressed demand by curtailing production and costs. A significant number of mines may remain closed and are not expected to reopen until economic conditions improve.

Apart from depressed economic conditions, copper, the province's leading metal, faces technological change that has eliminated or reduced many applications. If production capacity is to be fully utilized, market development efforts have to be stepped up.

Molybdenum may benefit in the future from growing demand for stronger light alloys. However, historical consumption will only recover when the economy recovers, steel use increases, capital investment resumes, and the current available mine capacity is fully utilized.

By-product metals like silver and gold will continue to be an important part of production which contribute to revenues from base metals to pay for the cost of total production.

Coal demand is expected to remain at current levels or decline marginally in the immediate future while additional supplies entering the market from new mines are scheduled for 1983-84. In view of the cutbacks in contract tonnages of about 30 per cent in 1982, little dramatic change in the markets for coal is expected until such time as the Japanese steel industry increases output.

In the face of the global economic downturn many producers in British Columbia, such as Cominco, Noranda, Teck, etc., incurred losses for the first time in recent history. Cost control and cash conservation became an overriding priority. A number of producers closed their operations for varying periods. Capital expenditures were curtailed, salary levels were frozen, wage increases were moderate, and a determined effort was mounted to increase productivity at all operations. These measures will prove beneficial when economic conditions improve.

MINING INDUSTRY IN 1982

The value of solid mineral production during 1982 was $1 884 million. This represents a decline of $240 million, or 11.3 per cent from the 1981 level, a result of weak demand and falling prices for most of the province's major minerals. Within the total solid mineral sector, metals accounted for 56.1 per cent of value, coal for 30.1 per cent, structural materials for 8.7 per cent, and industrial minerals for the remaining 5.1 per cent of total value.

METALS

The global recession and its impact on the construction, automobile, and durable consumer goods industries led to a considerable softening in demand for copper, lead, zinc, molybdenum, and other major metals produced in British Columbia. Total metal production in 1982 amounted to $1 057.5 million, a decline of $189.2 million or 15.2 per cent from 1981.

The production quantities of the major metals were all down in 1982 compared to a year earlier with the exception of iron concentrates, molybdenum, and silver. World metal prices for these commodities, except iron concentrates, were also reduced. Base metal prices, in particular, fell to the level where virtually all producers incurred losses.

Despite the substantial decrease in both production and price in 1982, copper remained the single most valuable metal mined in British Columbia, representing 46.8 per cent of metals and 26.3 per cent of all solid minerals produced in the province.

Average unit gross values for major metals paid to British Columbia producers during the year were all lower than in 1981. With 1981 values in parenthesis, they are: gold, $15.38 per gram ($17.54); silver, $0.32 per gram ($0.38); copper, $1.77 per kilogram ($2.11); lead $0.51 per kilogram ($0.73); zinc, $0.845 per kilogram ($0.846); and molybdenum, $10.51 per kilogram ($15.33).

Copper, the leading mineral product in British Columbia, suffered a 19.0-per-cent decrease in value of production to $495 million in 1982, the lowest level since 1979. All copper mines were affected. Employee layoffs, mine shutdowns, and temporary closures were commonplace.

The value of lead and zinc production in 1982 was considerably lower than the 1981 levels as the major producer, the Sullivan mine, reduced its production of the metals. Value of lead production dropped by almost one-third to $43.1 million in 1982 due to production cutbacks and a decrease of over 30 per cent in the metal price. Apart from poor economic conditions, the reduction was attributable to reduced demand for automobile batteries and the growing importance of lead-free gasoline, both of which could become long-term problems for lead. Zinc suffered a minor decline in production value to $63.6 million. World-wide zinc concentrate was in surplus for the first time in four years, a result of a major reduction in consumption in North America and expanded mine production in Canada, Mexico, and Australia. In British Columbia, a slightly lower quantity of the metal was produced during 1982 while the price of zinc remained within a narrow range around the 1981 level.

Molybdenum markets reflected the grim situation in the steel industry where operating rates dropped below 40 per cent of capacity in the United States. The downward slide in molybdenum price that started in mid-1979 continued to plaque British Columbia producers, reaching a low of $10.51 per kilogram in 1982, compared to $15.33 in 1981 and over $40.00 during its peak in 1979. The total value of production of $155 million was 21.8 per cent lower than 1981 as drastically reduced prices more than offset the moderately higher volume of production in 1982. Producers with molybdenum as primary products such as the Endako, Brenda, and Kitsault projects, were closed down at the end of 1982. Other producers also suffered losses in their co-product molybdenum operations.

Gold and silver producers in British Columbia were stimulated by the spectacular rise in precious metal prices during 1981. Production of precious metals remained high despite a levelling off in the prices in 1982. Total value of lode and placer gold production was $118.3 million, a moderate decrease from the 1981 level due to lower prices received.

Silver production set another historical annual record of 488.9 million grams in 1982, surpassing the previous record set in 1981. Value of production, which also set a record, totalled $158.3 million, a 3.8-per-cent gain over the 1981 production value. Almost all the increase in silver production came from Placer Development Ltd.'s Equity silver mine, which increased production by 57.0 per cent in 1982.

Iron concentrate production increased significantly, from 602 272 tonnes in 1981 to 774 951 tonnes in 1982. This, coupled with a price increase from $23.70 per tonne to $25.33 per tonne, brought the 1982 value of production to $19.6 million, an increase of 37.5 per cent over 1981.

Among the minor metals in the province, production of antimony and cadmium increased while production of bismuth, tin, and tungsten declined during 1982. In terms of value of production, all minor metals shared in the general decline experienced in British Columbia's metal mining sector except for antimony which, with a high price, demonstrated an impressive gain during the year to $1.2 million from $360 745 in 1981.

COAL

Coal has ranked third in value historically after copper and natural gas. Recent interest in the use of British Columbia coal for steelmaking in Japan and other countries has made British Columbia a major coal producer and exporter in a period of less than 10 years. The year 1982 was a landmark year as coal gained the first place in mineral production value for the first time, surpassing both copper and natural gas. Total coal production was valued at $566.9 million, an increase of 2.3 per cent over $554.3 million in 1981. Metallurgical coal accounted for 85.9 per cent of the total.

INDUSTRIAL MINERALS

Both the price and quantity of asbestos production decreased substantially, resulting in a 25.7 per cent decline in production value, to $57.0 million in 1982. Other industrial minerals such as sulphur, gypsum and gypsite, granules, etc., enjoyed higher prices in 1982 compared to 1981. However, production values for most industrial minerals were lower in 1982 due to reductions in production except fluxes and jade which experienced higher prices and production.

STRUCTURAL MATERIALS

The production value for structural materials was lower in 1982 as higher prices received for individual commodities were not sufficient to compensate for the reductions in production. In particular, sand and gravel production was down by 37.0 per cent from 42.3 million tonnes in 1981 to 26.7 million tonnes in 1982; cement was down 21.6 per cent from 955 922 tonnes in 1981 to 749 571 tonnes in 1982; rubble, riprap, and crushed rock were down 37.0 per cent from 3.2 million tonnes in 1981 to 2.7 million tonnes in 1982. Total production value for structural materials was $164.2 million in 1982, a decrease of 18.2 per cent from $200.8 million in 1981.

PROVINCIAL REVENUE FROM MINING COMPANIES

Severely depressed mineral prices greatly reduced incomes in all mining operations in British Columbia. As a result, provincial revenue from mineral resources during 1982 declined by almost one-half to $37.2 million in 1982 from $73.7 million collected in 1981. This significant drop in provincial revenue was largely attributable to the decreases in revenue derived from income-based levies, particularly on metal mining operations. The sharpest drop occurred in mineral resource taxes which fell from $32.2 million in 1981 to $1.2 million in 1982. Mining taxes were also down from $15.8 million to $6.4 million. Although mineral land tax, royalties, and other taxes from coal and industrial minerals increased somewhat in 1982, these increases were more than offset by heavy losses in other mineral revenue. Table 1-2 (page 18) provides some details of direct revenue to the provincial government derived from the mineral sector in 1982.

TABLE 1-2.

REVENUE FROM MINERAL RESOURCES IN BRITISH COLUMBIA

	1981 $	1982 $
Claims	4 178 169	3 860 320
Coal licences and rentals	3 128 752	2 954 387
Coal royalties	6 011 820	7 097 772
Iron ore royalties	24 295	45
Mineral land taxes	10 999 205	13 989 511
Mineral resource taxes	32 153 394	1 136 895
Mining taxes	15 747 983	6 378 279
Rental and royalties on industrial minerals and structural materials	1 492 601	1 811 830
TOTALS	73 736 219	37 229 037

EXPENDITURES BY MINING COMPANIES

The total expenditures by mining companies involved in exploration, development, and mining of metals, minerals, and coal declined to $2 268.1 million in 1982. Details by major expenditure are as follows:

TABLE 1-3.

EXPENDITURES, MINING COMPANIES, 1982

	$	$
Capital expenditures	358 387 211	
Exploration and development	545 477 142	903 864 353
Mining operations:		
Metals, minerals, coal		985 046 362
Structural materials		51 676 433
Repair expenditures		327 470 442
TOTAL		2 268 057 590

ACTIVITIES OF THE MINERAL RESOURCES DIVISION

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HISTORY AND DEVELOPMENT

The Mineral Resources Division has had a long history of development, starting in the mid nineteenth century as a system of Gold Commissioners and mining recorders to administer placer titles under the Provincial Secretary and developing into a Department of Mines in 1874. However, the Department did not have a separate Minister and Deputy Minister until the *Department Act* of 1899. Nevertheless, the Department and its mission evolved from being simply administration of title, to one of recording progress of the industry, stimulation of exploration and safety in quarries, coal and metal mines. In 1953, The Department took over administration of the *Petroleum and Natural Gas Act* and the *Coal Act* from the Department of Lands and thereafter administered title to coal lands as well as coal mine safety. Name changes occurred in 1960 to the Department of Mines and Petroleum Resources and in 1967 to Ministry. In a general realignment of Ministries in December 1978 the mandate was enlarged again to include responsibility for energy matters and it became the Ministry of Energy, Mines and Petroleum Resources. The solid mineral elements of the Ministry form the Mineral Resources Division, the largest of the three operational divisions.

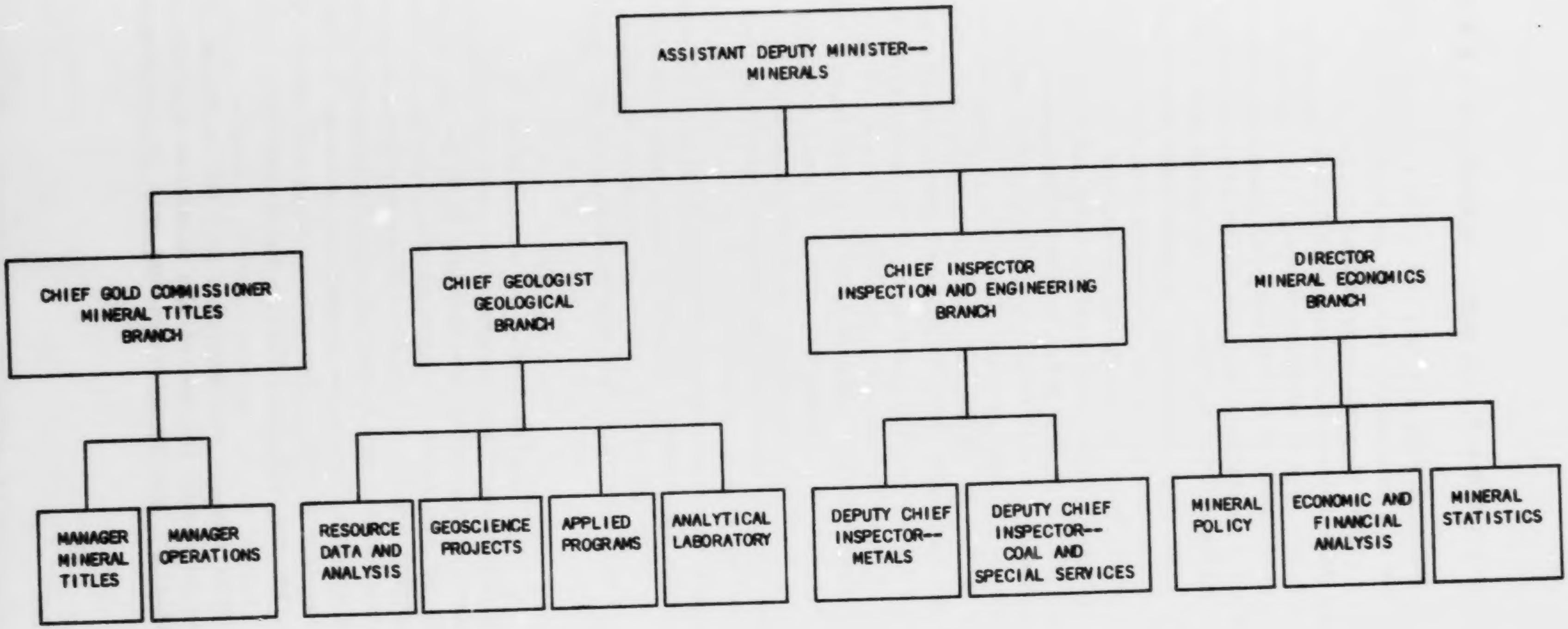
The Mineral Resources Division now maintains the tenure records of mineral claims, placer leases, and coal licences; provides the inspection and engineering services for worker and public safety in and around mines; ensures optimum extraction of mineral resources and reclamation of lands disturbed by mining; carries out geoscientific surveys, studies, and compilations to assist and stimulate land use, and taxation factors as they relate to the mineral industry; and administer guidelines to new mine development. To carry out these tasks it is organized into four branches: Titles, Inspection and Engineering, Geological, and Mineral Economics.

The branches of the division developed sequentially as need dictated starting with the appointment of the first Gold Commissioner in 1859 to administer placer title under the Provincial Secretary. The majority of recording offices are still not part of the Ministry but in the Ministry because government agents act as Gold Commissioners and mine recorders. A Chief Gold Commissioner was appointed as a Departmental official in 1937, and a central records office was created in Victoria in the same year followed thereafter by one in Vancouver. Claim inspectors were first appointed in 1974 and a Mineral Titles Branch created.

A Provincial Mineralogist was appointed in 1895 in charge of a Bureau of Mines that was to record and assist the development of the mining industry. Initially, the Bureau consisted only of the Provincial

TABLE 2-1. ORGANIZATION CHART

MINERAL RESOURCES DIVISION


ASSISTANT DEPUTY MINISTER--
MINERALS
CHIEF GOLD COMMISSIONER
MINERAL TITLES
BRANCH
CHIEF GEOLOGIST
GEOLOGICAL
BRANCH
CHIEF INSPECTOR
INSPECTION AND ENGINEERING
BRANCH
DIRECTOR
MINERAL ECONOMICS
BRANCH
MANAGER
MINERAL
TITLES
MANAGER
OPERATIONS
RESOURCE
DATA AND
ANALYSIS
GEOSCIENCE
PROJECTS
APPLIED
PROGRAMS
ANALYTICAL
LABORATORY
DEPUTY CHIEF
INSPECTOR--
METALS
DEPUTY CHIEF
INSPECTOR--
COAL AND
SPECIAL SERVICES
MINERAL
POLICY
ECONOMIC AND
FINANCIAL
ANALYSIS
MINERAL
STATISTICS

Mineralogist and Provincial Assayer. Some additional staff were added leading to reorganization of the Bureau into six mineral survey districts with Resident Engineers appointed under the *Mineral Survey and Development Act* in 1917. The Bureau continued in this manner until 1934 when it was reorganized to become the Mineralogical Branch consisting of geological engineers based in Victoria. This evolved to the present Geological Branch in 1974 when once again district geologists' offices were established in addition to the geological survey offices in Victoria.

The first Inspector of Mines was appointed in 1877 at Nanaimo to supervise mine safety in the coal mines of Vancouver Island. An inspector of metalliferous mines was appointed, based in Nelson, in 1897. Two others were appointed soon after to inspect coal in the Crowsnest Coalfield and metaliferous mines. A Chief Inspector was appointed in 1908 with augmented staff but the branch was not created until 1929. It evolved with wider engineering and resource duties into the Inspection and Engineering Branch of today.

The last element to be created was the Mineral Economics Branch although its statistical duties had been performed first by the Bureau and then by the predecessor of Industry and Small Business Development. This was returned to the Ministry in 1974 as part of Planning and Economics Branch that acted for the whole Ministry. In 1976, this became Mineral Economics with a focus on mineral resources.

ACTIVITY OF THE DIVISION

The objectives of the Mineral Resources Division are:

- To promote the orderly development of the minerals of British Columbia
- To facilitate the process of discovery and renewal of the province's mineral resources
- To administer title to the mineral resources of the province in an efficient and effective manner
- To ensure the extraction of the province's mineral resources in a manner consistent with worker and public safety, and with resource conservation and with minimum environmental degradation
- To provide timely and quality economic and statistical services relating to the mineral sector

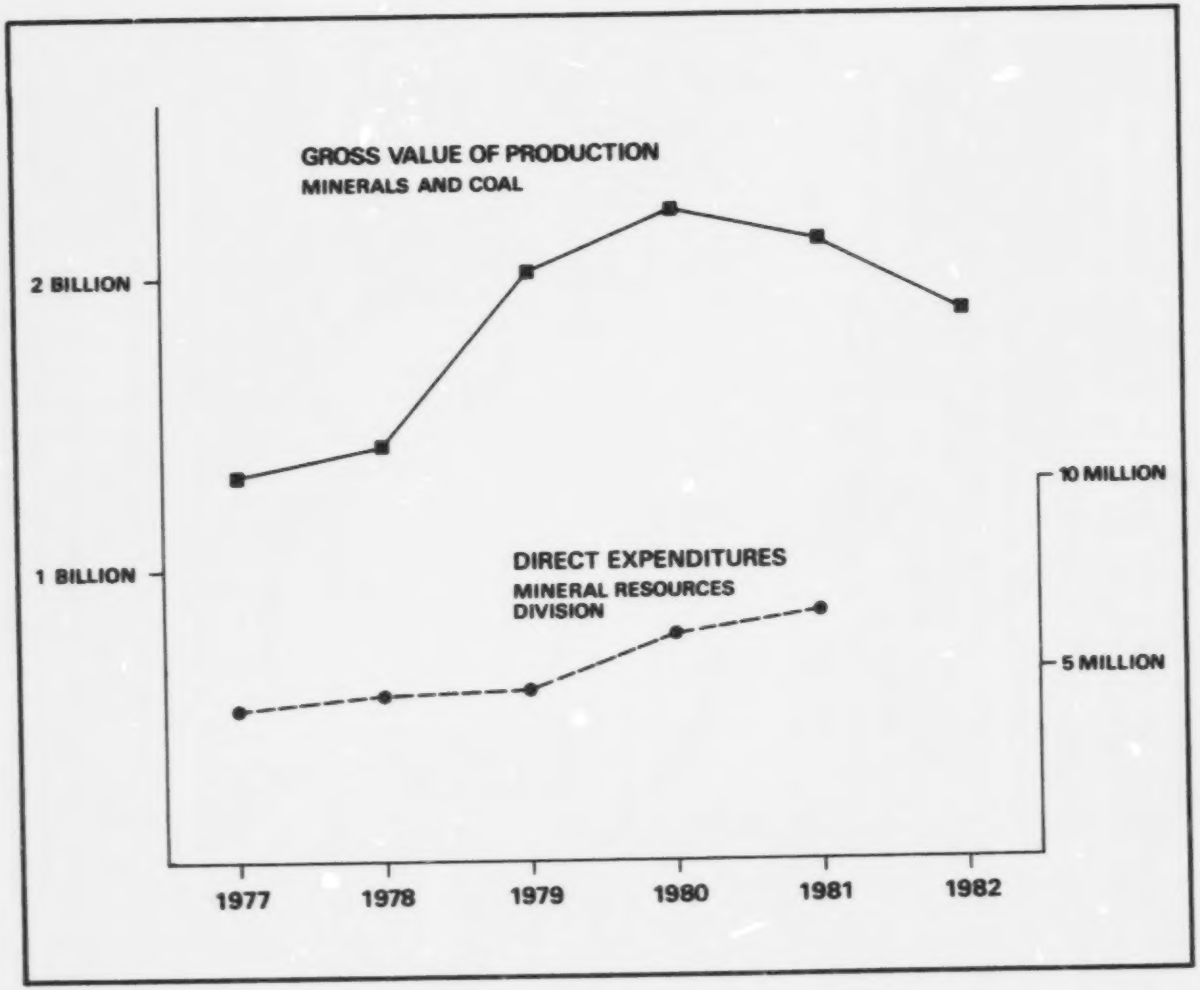


Figure 2-1. Gross Value of Production and Direct Expenditures

To carry out the objectives, the division is organized into four branches as shown on the organization chart (Table 2-1) and their functions are summarized in Table 2-2. The budget to carry out the functioning of the division is shown on Figure 2-1 in relationship to the gross value of production of minerals and coal in the province.

TABLE 2.2. FUNCTIONS OF THE MINERAL RESOURCES DIVISION

MINERAL RESOURCES DIVISION
ORGANIZATION AND FUNCTIONS

ASSISTANT DEPUTY MINISTER

MINERAL TITLES	GEOLOGICAL	INSPECTION AND ENGINEERING	MINERAL ECONOMICS
MANAGEMENT OF MINERAL, COAL, PLACER TITLE	COAL AND MINERALS RESOURCE INVENTORY	SAFETY ENGINEERING	ECONOMIC/FINANCIAL ANALYSIS
TITLES POLICY AND LEGISLATION DEVELOPMENT	GEOSCIENTIFIC SURVEYS AND MAPPING	MINER HEALTH AND SAFETY	MINERAL POLICY DEVELOPMENT
CLAIM MAP SERVICE	FIELD AID AND LIAISON	PUBLIC MINING HAZARD ABATEMENT	MINE PRODUCTION STATISTICS
CLAIMS INSPECTION	EXPLORATION MONITORING	MINE RESCUE TRAINING	INTERGOVERNMENTAL LIAISON
	LAND USE STUDIES	MINE RECLAMATION AND MINE ENVIRONMENT	
	ANALYTICAL LABORATORY	RESOURCE CONSERVATION	
	PROSPECTORS' ASSISTANCE	MINERAL AND COAL DEVELOPMENT GUIDELINES	
		MINING ROADS	

LEGISLATION

The legislative authority for the activities of the division and the Acts it administers while performing its function are:

Ministry of Energy, Mines and Petroleum Resources Act
Mineral Act
Mining (Placer) Act
Coal Act
Mining Regulation Act
Coal Mine Regulation Act
Mineral Prospectors Act

During 1982 only minor housekeeping revisions were introduced in regard to the *Coal Act*.

The *Mining Regulation Act* and *Coal Mine Regulation Act* have been revised into a combined act, the *Mines Act*, but this has not been proclaimed pending completion of the regulations.

MANAGEMENT

A difficult management situation existed during all of 1982 due to a series of changes brought on by resignations, retirements, leave of absence restraint and death. Dr. A. J. Freyman resigned as Assistant Deputy Minister in April and Dr. A. Sutherland Brown acted in addition to being Chief Geologist until the appointment of Lorne E. Sivertson late in November. Mr. Sivertson had previously been an Assistant Deputy Minister in the Ministry of Industry and Small business Development. Prior to that he was successively at the Resource Institute at the University of Victoria and mineral economist with the Ministry of Mines and Petroleum Resources.

Titles Branch had only one permanent senior position on staff during the year, necessitating a succession of Acting Chief Gold Commissioners. Mineral Economics Branch also functioned all year with an Acting Director.

EVALUATIONS

The disrupted management situation did, however, coincide with the initiation of a series of useful external evaluations of the division and certain elements of its mandate. Each of the four branches was reviewed by an external Advisory Committee of experts. They were requested to review the need for the branch, level of effort, direction; relationship to industry, labour, other government agencies, and university; objectives, operations, and management. The reports have been very useful to management and staff.

Three other external reports of diverse nature were commissioned. A further study was carried out by Price Waterhouse Associates into the administration and procedures of the Mineral Titles Branch. A report was commissioned by the Canadian Institute of Resources Law, University of Calgary to review surface and subsurface rights for minerals in British Columbia. Another report was conducted by the University of Victoria School of Public Administration to evaluate the Divisions exploration incentive programs, particularly the Prospectors' Assistance Program.

GEOGRAPHIC DISTRIBUTION OF OFFICES

The Ministry of Energy, Mines and Petroleum Resources has had its administration regionalized as have some ministries but it does have district offices. The Mineral Resources Division has a need for a continuing presence in the mining areas and coalfields for a number of functions: mines inspection, mine rescue, district geologists, claim inspection. In addition the recording function is conducted outside Victoria and Vancouver by Gold Commissioners and mine recorders at offices of the government agents of the Ministry of Finance. The distribution of offices of the division is shown on Figure 2-2 (page 28) together with the function performed.

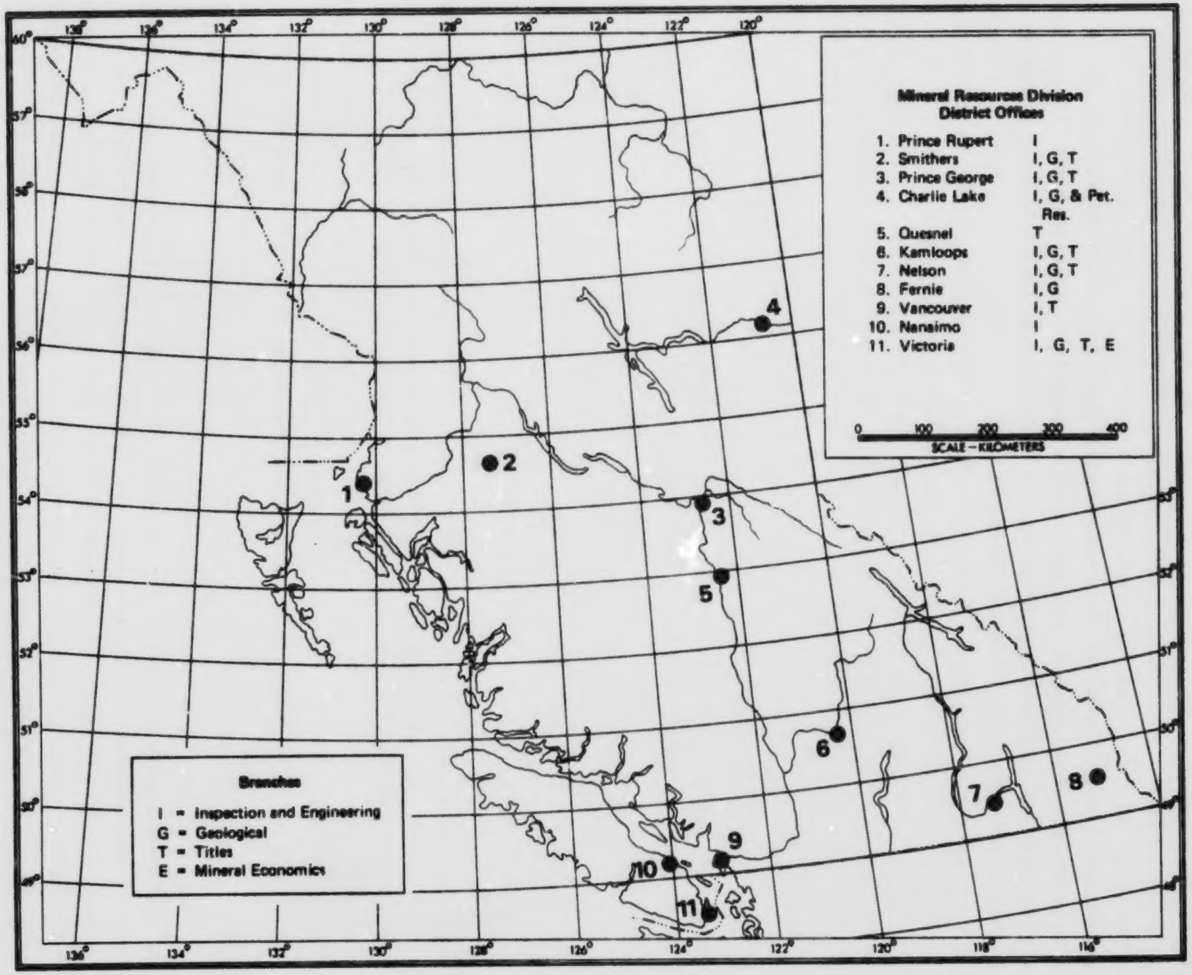

Mineral Resources Division
District Offices
1. Prince Rupert I
2. Smithers I, G, T
3. Prince George I, G, T
4. Charlie Lake I, G, & Pet. Res.
5. Quesnel T
6. Kamloops I, G, T
7. Nelson I, G, T
8. Fernie I, G
9. Vancouver I, T
10. Nanaimo I
11. Victoria I, G, T, E
0
100
200
300
400
SCALE – KILOMETERS
Branches
I = Inspection and Engineering
G = Geological
T = Titles
E = Mineral Economics
1
2
3
4
5
6
7
8
9
10
11
60°
57°
58°
57°
56°
55°
54°
53°
52°
51°
50°
49°
138°
136°
134°
132°
130°
128°
126°
124°
122°
120°
118°
116°

Figure 2-2. Mineral Resources Division, District Offices

GEOLOGICAL BRANCH

OBJECTIVES AND ORGANIZATION

The solid mineral industries, metallic, non-metallic and coal, need to engage continuously in exploration to replace the resources currently being mined. The role of the Geological Branch is to facilitate this search in every way possible within its budget. The branch conducts geological mapping, other geoscience surveys, resource studies, and geoscience data-base construction to provide industry with maps and information essential to intelligent exploration. Much of this same information provides the basis for government stewardship of the subsurface resources.

To carry out its objectives the branch is organized into four sections: Geoscience Projects, Applied Programs, Resource Data and Analysis, and Analytical Laboratory. Three tables summarize the organization (Table 2-3), the objectives and tasks by section (Table 2-4), and the program responsibility matrix (Table 2-5).

TABLE 2-5

GEOLOGICAL BRANCH MANAGEMENT AND ORGANIZATION MATRIX

		ORGANIZATION AND PROGRAM RESPONSIBILITY			
		PROJECT	APPLIED	RESOURCE DATA	LAB.
DISCIPLINES AND INTERSTS	RESOURCE TYPE				
	Metallic	*	*	*	*
	Nonmetallic	-	-	*	+
	Coal	*	*	*	*
	Geothermal	-			
	RESEARCH AND DEVELOPMENT				
	Geoscience research	*	+	-	-
	Geological surveys	*	+	-	
	Geochemical surveys and control	*	-	-	*
	Analytical method development	-			*
	FUNCTIONS				
	Land use analysis and management	-	+	*	
	Resource inventory analysis and management	-	+	*	
	Industry intelligence	+	*	*	
	Consultation service	*	*	*	+
	Data processing	-		*	-
	Core storage		*		
	Prospector training	+	*	-	-
	Geologist training	+	*	-	
	Assayer certification				*

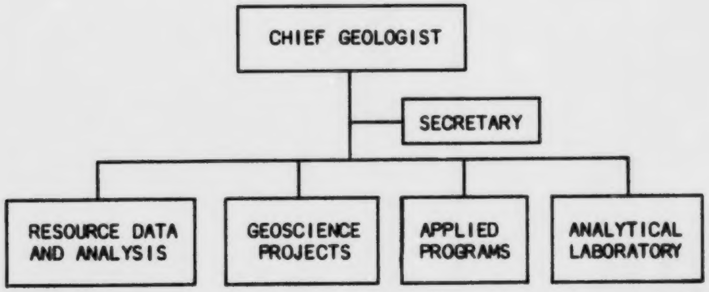
* = MAJOR ROLE; + = IMPORTANT ROLE; - = MINOR ROLE; (blank) = NIL.

TABLE 2-3

ORGANIZATION, MANPOWER, BUDGET

GEOLOGICAL BRANCH

December 31, 1982


CHIEF GEOLOGIST
SECRETARY
RESOURCE DATA AND ANALYSIS
GEOSCIENCE PROJECTS
APPLIED PROGRAMS
ANALYTICAL LABORATORY

STAFF		RESOURCE DATA AND ANALYSIS	GEOSCIENCE PROJECTS	APPLIED PROGRAMS	ANALYTICAL LABORATORY	GENERAL MANAGEMENT	BRANCH TOTAL
PERMANENT		9	15	11	10	2	47 man-years
VACANT/FROZEN		2	2	-	0	-	4 man-years
AUXILIARY:	CONTINUING	6 1/2	1	2 1/2	1	-	11 man-years
	SUMMER	3 1/2	5	1/2	1/2	-	9 1/2 man-years
BUDGET:	80/81	$420.8K	$894.7K	$498.6K	$344.7K	$100.4K	$2 229.8K
	81/82	$656.2K	$856.7K	$530.8K	$393.5K	$101.2K	$2 558.6K
	82/83	$746.9K	$824.2K	$505.9K	$404.5K	$192.0K	$2 663.4K

SUPPLEMENTARY PROGRAMS

	COMPUTERIZING COAL INVENTORY	REGIONAL GEOCHEMICAL SURVEYS RELATED RESEARCH	PROSPECTORS' ASSISTANCE	
80/81	$61.5K	$410.0K	$283.2K	$754.7K
81/82	0	$372.9K	$310.0K	$682.9K
82/83	0	0	$100.0K	$100.0K

GRAND TOTAL	80/81	$2 984.5K
	81/82	$3 241.5K
	82/83	$2 763.4K

TABLE 2-4

GEOLOGICAL BRANCH

	RESOURCE DATA AND ANALYSIS	GEOSCIENCE PROJECTS	APPLIED GEOLOGY	ANALYTICAL LABORATORY
OBJECTIVES	* DATA BASE CONSTRUCTION * LAND USE MANAGEMENT * RESOURCE DEVELOPMENT	* DEVELOP EXPLORATION DATA AND CONCEPTS * METALLOGENY AND DEPOSIT MODELLING * REGIONAL AND COMMODITY EXPERTISE	* MONITOR EXPLORATION ACTIVITY * FIELD AID TO INDUSTRY * PROSPECTOR TRAINING * LAND USE MANAGEMENT	* CHEMICAL BACK-UP * QUALITY CONTROL * ANALYTICAL RESEARCH * AID TO INDUSTRY
TASKS	INVENTORIES REPORT APPROVALS NON-METALLIC STUDIES LAND USE EVALUATIONS RESOURCE ANALYSIS	GEOLOGICAL MAPPING AND RESEARCH GEOSCIENCE REPORTS REGIONAL GEOCHEMICAL AND GEOPHYSICAL SURVEYS	EXPLORATION MONITORING AND FIELD AID BY DISTRICT GEOLOGISTS MINERAL EXPLORATION INCENTIVE PROGRAM PROSPECTOR GRANTS AND COURSES SITE-SPECIFIC LAND USE STUDIES	ASSAYS AND CHEMICAL ANALYSES ANALYTICAL RESEARCH AND METHOD DEVELOPMENT CONTROL FOR GEOCHEM PROGRAM MINERAL SEPARATIONS

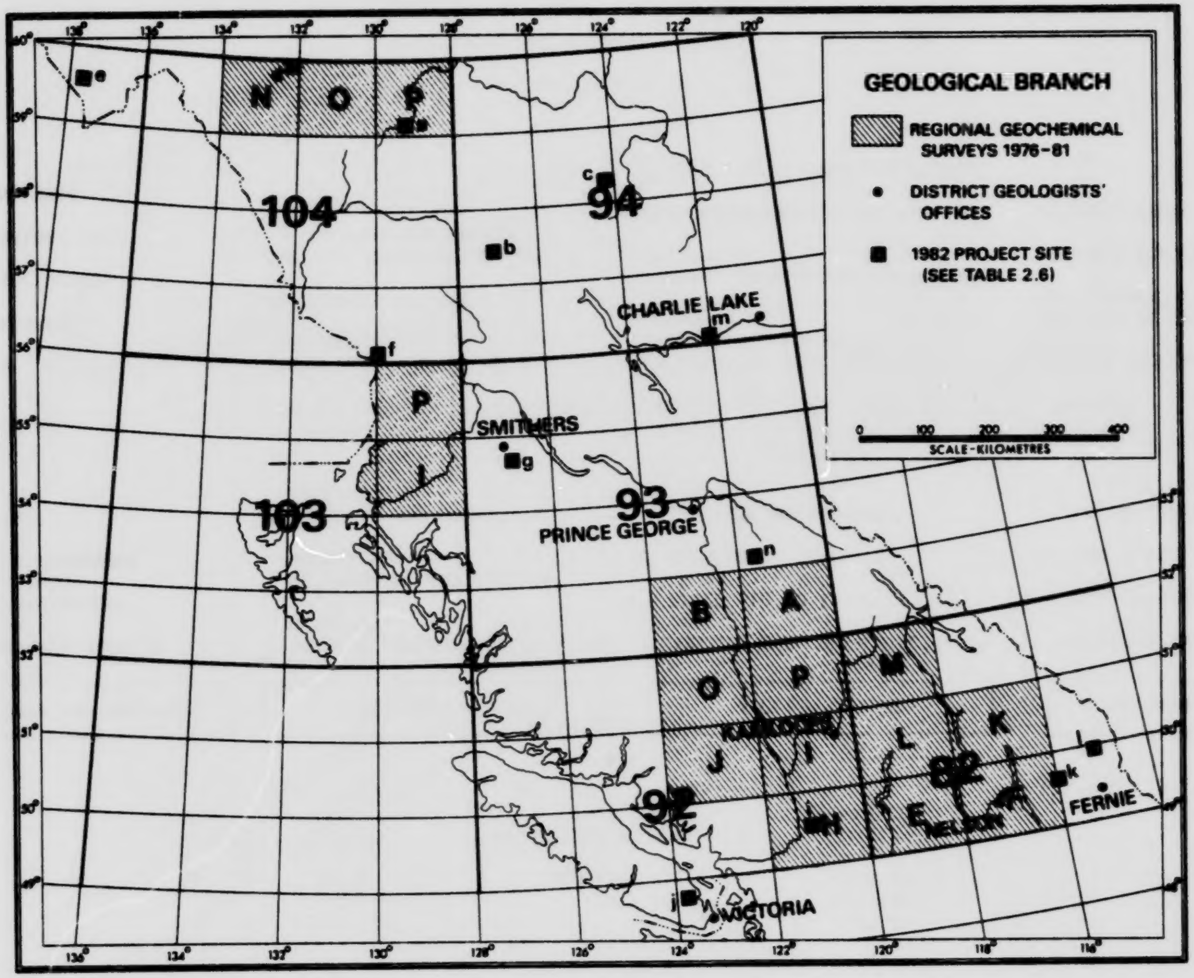

GEOLOGICAL BRANCH
REGIONAL GEOCHEMICAL SURVEYS 1976-81
DISTRICT GEOLOGISTS' OFFICES
1982 PROJECT SITE (SEE TABLE 2.6)
0
100
200
300
400
SCALE-KILOMETRES
104
94
93
103
92
82
N
O
P
I
B
A
M
J
L
K
H
E
a
b
c
e
f
g
i
j
k
l
m
n
CHARLIE LAKE
SMITHERS
PRINCE GEORGE
KAMLOOPS
NELSON
FERNIE
VICTORIA
136°
134°
132°
130°
128°
126°
124°
122°
120°
118°
116°
60°
59°
58°
57°
56°
55°
54°
53°
52°
51°
50°
49°

Figure 2.3. Geological Branch, Regional Geochemical Surveys, District Geologists' Offices, and Project Sites

DISCIPLINES AND FIELD OF INTEREST

STAFF

The staff, under the direction of Chief Geologist A. Sutherland Brown, on December 31, 1982 included 47 permanent, 4 frozen, and 10 temporary positions. The greatly depleted staff of 1981 was augmented by the filling of six positions by competition. These included the manager and assistant manager of Applied Programs, two coal project geologists, and two district geologists. Auxiliary and contract staff continued to enable the branch to respond to the increased demands in land use and inventory.

The permanent staff included 26 geoscientists, 6 analytical chemists, 10 technicians and technical assistants, and 5 office assistants. Temporary staff included 2.5 man-years geoscientists, 1 chemist, 5 technical assistants and 2.5 office assistants on a continuing basis, and about 9 man-years of summer assistants.

STAFF CHANGES

The serious staff shortages of 1981 were partially alleviated in 1982. As a result the branch was able to complete most of its scheduled projects and before a hiring freeze was imposed. Dr. V. A. Preto was appointed Manager of Applied Programs, moving from Project Geology. Mr. Paul Wilton, formerly with Cominco Ltd., was appointed assistant manager and district geologist, Victoria. Dr. Jahak Koo, formerly of the University of British Columbia and Mr. Ward Kilby, formerly of Esso Resources, were appointed coal project geologists. Dr. E. L. Faulkner, formerly of the College of New Caledonia, was appointed district geologist, Prince George, and Mr. Andrew Legun, formerly with the Ontario Geological Survey, was appointed district geologist, Fort St. John. Dr. W. R. Smyth, formerly with Department of Mines and Energy, Newfoundland, was appointed senior land use geologist, and Ann Ratel was appointed land use coordinator. These appointments left the branch in a relatively strong position to carry out its assigned objectives.

THE WORK OF THE BRANCH

The work of the branch is reviewed by section but the interrelationship and cooperative nature of the work is shown in Table 2-5. Figure 2-3 shows the areal distribution of the district offices and the various projects active in 1982 together with the geochemical survey coverage to date.

TABLE 2-6

MAJOR PROJECTS IN 1982

	PROJECT	NTS AREA	MAP SCALE	PRINCIPAL INVESTIGATOR	STAGE %	PUBLICATION
(a)	Cassiar precious metal deposits (Au, Ag)	104P/4, 5	1:25 000	A. Panteleyev L.J. Diakow***	C	GF 81
(b)	Toodoggone volcanic field (Au, Ag, Cu)	94E	1:25 000	A. Panteleyev T.G. Schroeter* L.J. Diakow	75	GF 82
(c)	Akie River (Driftpile Creek)	94L	1:50 000	D.G. MacIntyre	90	GF 82 PM 38,44,50
(d)	Midway deposit	104O/16	1:5 000	D.G. MacIntyre	35	GF 82
(e)	Alsek (Windy-Craggy) (Cu, Co)	104P/12	1:20 000	D.G. MacIntyre	40	GF 82
(f)	Salmon River (Cu, Au, Ag)	104B/1	1:10 000	D.J. Alldrick	35	GF 82
(d)	Telkwa Coalfield	93L	1:10 000	J. Koo	75	GF 82
(h)	Tertiary basin resources	82/92	1:86 486 1:100 000	B.N. Church	C	PM 37,39,41,45,48 GF 82
(i)	Coquihalla belt (Au)	92H/6	1:5 000 1:50 000	G.E. Ray	70	GF 81/82
(j)	Sicker Group (Cu, Zn, Au, Ag)	92B/13	1:25 000	G.E.P. Eastwood	C	PM 40
(k)	Kimberley area Purcell Supergroup (Pb, Zn, Ag)	82F/6	1:50 000	T. Hoy	90	GF 82 PM 34,36,49
(l)	Line Creek and Crown Mountain (coal)	82G/10, 15	1:10 000	D.A. Grieve* J.M. Fraser***	C	GF 82
(m)	Williston Lake area (coal)	93O/15, 16 94B/1, 2	1:50 000	A. Legun*	25	GF 82
(n)	Mosquito Creek mine (Au)	93H/4	1:1 200 1:10 000	D. Alldrick	75	GF 82
(o)	Silica	BC		Hora**		GF 82

* = District Geologist; ** = Resource Data and Analysis Geologist; *** = Graduate Assistant;
C = Complete; GF = Geological Fieldwork; PM = Preliminary Map

GEOSCIENCE PROJECTS

The work of this section, directed by Dr. W. J. McMillan, is devoted principally to geological and geochemical surveys of areas important for mineral resources, and to research leading to better understanding of the origin and distribution of mineral deposits. The objective of the mapping and research is to provide the exploration industry with data and concepts that will lead to discovery of mineral and coal resources to sustain a productive mineral industry in British Columbia. The results of the work lead incidentally to better understanding of the geology of the British Columbian land mass that is useful for many unrelated facets from geological hazards to understanding the chemistry of soils.

The section cooperates with the other sections in running projects, the geochemical surveys, resource evaluation as shown on Tables 2-5 and 2-6. No geochemical survey was conducted in 1982 but the results of the 1981 surveys of Hope (92H), Ashcroft (92I), and Pemberton (92J) were released in July 1982 and stimulated considerable claim location and exploration. Grants to university professors and graduate students for research related to the mandate of the Branch were discontinued in 1982 but work from previous grants continued and is reported in *Geological Fieldwork, 1982* (Paper 1983-1).

APPLIED PROGRAMS

The work of this section, directed by Dr. V. A. Preto, is devoted to practical programs based from seven district offices to aid and monitor exploration. The multifaceted job of the district geologists is the principal means by which the section carries out its program. This work includes:

- Aid in the field and district office to exploration personnel
- Mineral property examinations
- Monitoring of exploration efforts and geological developments at operating mines
- Geological field mapping, commonly in cooperation with project geologists
- Site-specific mineral land use studies
- Prospector training, grant review and field aid
- Represent Ministry of Energy, Mines and Petroleum Resources at regional meetings

Because prospectors fill a very important role in the exploration process, considerable effort by the section is devoted to prospector training, aid and grants. In 1982 basic prospector courses were conducted, normally sponsored by a local school board. The Sixth Annual Mineral Exploration course was held in the north as an experiment. Twenty-eight advanced prospectors graduated from the 15-day course held in Terrace in May and sponsored by the Ministry of Education and Northwest College and Ministry of Energy, Mines and Petroleum Resources. Ninety-one prospectors received grants after submission of a program that was approved. In addition the effectiveness of the prospector training, grants and former Mineral Exploration Incentive Program was subject of an independent program review by the University of Victoria's School of Public Administration.

The section has been responsible for coal core recovery, storage, and study at the district office at Charlie Lake. The facility contained, at the end of 1982, approximately 159 000 metres of exploration core which is repeatedly used for stratigraphic and engineering studies by industry and government. Most of the core comes from the Peace River Coalfield but representative core is present from most coalfields except the Crowsnest.

The section had suffered major staff shortages in 1981 but these positions were filled with able persons in 1982 so that the section could function normally.

Budget expenditures for 1982 were as follows: permanent salaries, $402 613; auxiliary salaries, $34 850; operational costs, $153 586. In addition, Prospectors' Assistance Grants totalled $100 250.

RESOURCE DATA AND ANALYSIS

This section, directed by J. G. McArthur, is responsible for mineral and coal inventory and analysis, and for non-metallic and mineral land use studies. The inventories involved the collection, statutory approval, compilation, computerization, interpretation, and dissemination of industry-derived exploration and development data. Much of this data would be lost and would need to be repeatedly reproduced at great expense were it not recovered by this section and made publically available. The industry-derived data is combined with geoscience data generated by Geoscience Projects, Applied Programs, and the Geological Survey of Canada for analysis in regard to resource studies for stewardship by government and for mineral land use studies in regard to single land use alienations proposed by other ministries. In addition, the section is responsible for field-oriented studies, inventory, and advice in regard to industrial minerals and structural materials.

The major files developed during its work are:

Mineral Assessment Reports--a library in Victoria contains 10 500 reports with over 7 900 microfilmed reports available at reader/printers in Vancouver and Victoria

Mineral Assessment Report Index--a computerized bibliographic index and map series updated annually

MINFILE--a shallow level computerized information system with data on over 8 600 mineral occurrences; statistical data on mineral production and reserves; a companion to the Mineral Inventory map series

Property Files--open files containing published and unpublished reports and maps (historical) on producers and prospects and filed by NTS, approximately 1 700 properties

Coal Assessment Reports--nearly 500 reports on coal exploration; non-confidential files available in Victoria

COALFILE--an operational comprehensive computerized coal exploration data file

Mineral Deposit/Land Use Map Series--a series of interpretive mineral potential maps

The annual volume, *Exploration in British Columbia*, is produced by the section coincident with its update of MINFILE.

In addition, the section administers approximately 500 Portable Assessment Credit accounts, totalling $37 million, produces map compilations and mineral potential evaluation studies related to land use conflicts, and advises on regulations.

Field-oriented studies related to industrial minerals and structural materials are also handled by this section. During 1982 fieldwork to evaluate silica occurrences in British Columbia was completed. The results of a supply/demand study for barite in Western Canada initiated by this section were published in the CIM Bulletin. For the all-Canadian meeting of Industrial Minerals Specialists in Ottawa, Z. D. Hora prepared an overview, *Industrial Minerals in British Columbia in 1981-1982*. A new project to evaluate rutile potential in tailings from porphyry copper deposits was also started in 1982. As a result of the concern, recommendations of this section to the Coquitlam Mountain Study, the Ministry of Lands, Parks and Housing contracted out a study to analyse the aggregate potential of the Westwood Plateau, and the first stage was completed and presented for review in late 1982.

MINERAL LAND USE

A number of detailed, office-based, mineral resource assessment studies were undertaken in 1982 to assist government decisions on land use.

Reports were completed for the following park proposals: Kakwa Planning Area, Akamina-Kishinena Area, Slocan Valley Area, Cascade Park Proposal, Chilko Planning Area, and South Moresby Planning Area.

The land use office played a major role in organizing a three-day Ministry Land Use Policy Review conducted at the University of Victoria in November 1982 and led by well-known land use consultant Gary Runka. The review was successful in meeting its objectives of (1) discussing major land and water use issues as developed by the planning branches of other resource ministries and interagency groups, (2) collectively reviewing a draft of this Ministry's Land Use Policy Discussion Paper, and (3) as a training session for Ministry staff required to represent the Ministry on land use issues.

J. G. McArthur, Manager, and T. G. Schroeter, District Geologist, Smithers, represented the branch on the Task Force studying Economic Development in the Northwest Region of the province initiated by the Cabinet Committee on Economic Development.

The approximate budget of this section, distributed by function, was: mineral inventory, $162 892; coal inventory, $99 956; industrial minerals, $93 897; mineral land use and resource analysis, $108 119; computer and consultants, $224 816; management, $47 092; total, $736 772. Of this total, $316 237 was for permanent staff salaries.

ANALYTICAL LABORATORY

The Analytical Laboratory, under Dr. W. M. Johnson, is responsible for a complete range of analytical work in support of the projects of the project and district geologists of the branch. It also provides analytical support for the Prospectors' Assistance Program and performs a limited number of free analyses for *bona fide* prospectors holding a valid Free Miner's Certificate. Some analytical work is performed for other government agencies, and laboratory staff act as consultants on a wide range of topics for agencies such as the Consumer Taxation Branch of the Ministry of Finance, the Ministry of Industry and Small Business Development, the Ministry of Transportation and Highways, the Energy Resources Division of the Ministry of Energy, Mines and Petroleum Resources, and various commercial and mining laboratories. The laboratory is also responsible for the standards used in the Regional Geochemical Program and the quality control for the program as well as for assistance in its organization and administration. The Chief Analyst, in the capacity as Chairman of the Board of Examiners, is responsible for the *Ministry of Energy, Mines and Petroleum Resources Act* (sections 13 through 20).

The facilities of the laboratory include comminution and mineral separation equipment, X-ray fluorescence, atomic absorption, gamma-ray and emission spectrometric instruments, and an X-ray diffractometer. The laboratory is also capable of performing traditional fire assay and wet chemical analyses.

There was a significant amount of method development and research done in the laboratory during 1982. The analysis of coal liquids, work on geochemical standards, a continuation of a study of the mineralogy of the Tillicum Mountain gold deposit, and a critical review of the overall data quality of the Regional Geochemical Program are included. These studies were as follows:

Dr. J. Kwong received his Ph.D. from the University of British Columbia. His thesis was based on a study of the mineralogy of the Afton copper deposit.

Continued development of techniques for the analysis of coal liquids by Mr. Paul Biehm, Ms. Kathy Colbourne, and Dr. Paul West of the University of Victoria in close relationship with British Columbia Research.

The participation of Dr. W. M. Johnson in a study into umpire analyses errors in the shipments of lead concentrates from a major Canadian mining firm.

Continuing development of methodology for the determination of major and trace elements using X-ray fluorescence techniques by Dr. V.V.B. Vilkos.

A continuing combined field and laboratory study of the mineralogy of the Tillicum Mountain gold deposit by Dr. Y.T.J. Kwong in conjunction with Mr. G. G. Addie.

A study of the possibility of extracting titanium from the mine tailings of copper mines in the province by Dr. Y.T.J. Kwong and Mr. Z. D. Hora.

Continued participation in interlaboratory standard reference material programs including supplying sample material for the purpose by Mr. B. Bhagwanani, Mr. M. A. Chaudhry, Dr. W. M. Johnson, and Mr. P. F. Ralph.

Continued participation by Dr. W. M. Johnson in Canada/Japan studies on the liquefaction of British Columbia coals.

CERTIFICATION

There were seven Certificates of Efficiency in Assaying awarded out of a total of 21 candidates.

OUTPUT

Wet Chemical and X-ray Flourescence Laboratory--There were 15 046 results reported on 2 595 samples submitted by general prospectors, Prospectos' Assistance grantees, and Ministry personnel. In addition, there were 1 292 fire assay results reported.

Emission Spectrographic Laboratory--There were 56 160 semi-quantitative determinations made on 1 972 samples and 1 090 quantitative results on 457 samples.

X-ray Diffraction Laboratory--There were 1 214 mineral identifications made and 292 quantitative mineral determinations.

Mineral Separation--There were 19 mineral separates prepared for subsequent analytical work.

Sample Comminution--A total of 1 965 samples were received and prepared from prospectors and Ministry personnel.

The output of the laboratory was significantly higher in 1982 than in 1981, reflecting the introduction of the automatic sample changer and the completion of work on two large projects from Ministry geologists.

BUDGET

The laboratory's budget was $281 293 for permanent salaries, $44 317 for supplies and equipment, and $78 900 for travel, special services, temporary salaries, and miscellaneous.

PROFESSIONAL ACTIVITIES

The staff of the branch was active during 1982 in professional activities related to their work, including organizing and attending scientific meetings, field visits, and executive activities in societies. The focus of much of this activity is to bring to the attention of the mineral exploration industry the potential of areas where the branch is working or new concepts of mineral deposit geology.

The branch held its biennial program review and open house in February in Victoria which was attended by a large number of geologists, principally exploration staff from industry in Vancouver and Calgary. The meeting included a day of talks on the progress of field investigations and an evening poster session.

A workshop on Northeastern British Columbia Coalfields was organized by C. Kenyon and C. Sturko in February at Schooner Cove, Vancouver Island, with participation by industry and government.

In addition, branch staff was active in the Geological Association of Canada (GAC) Cordilleran Symposium in Vancouver in February (G. E. Ray, W. J. McMillan, A. Panteleyev, and V. A. Preto) and almost all staff in preparing for the national joint annual meetings of Geological Association of Canada (GAC), Mineralogical Association of Canada (MAC), and Canadian Geophysical Union (CGU) to take place in May 1983.

Branch geologists were also active leading mineral deposit fieldtrips for Geological Association of Canada and Canadian Institute of Mining and Metallurgy (CIM) including a GAC trip to the Highland Valley (W. J. McMillan), and a joint industry-University of British Columbia trip to mines in southeastern British Columbia (T. Höy, B. N. Church, and G. G. Addie). Branch scientists gave a large number of scientific talks in British Columbia and elsewhere, many sponsored by societies and other outside institutions. Most notable was the E. T. Emmons lectures at Golden, Colorado, by A. Panteleyev on *Metallogeny of the Canadian Cordillera* to the Colorado Geological Society and the Colorado School of Mines. In addition, T. G. Schroeter talked by invitation in Edmonton and Calgary on epithermal gold deposits of the Toodoggone area of British Columbia, at the United States Geological Survey at Washington, D.C., and at the Whitehorse Geoscience Forum. A. Sutherland Brown organized and co-chaired a symposium on Methods of *Predictive Metallogeny* at the GAC annual meeting in Winnipeg on behalf of the Committee of Provincial Geologists.

Educational travel was a casualty of restraint but geologists continued their education at their own expense as for example, A. Panteleyev attended the Society of Economic Geologists fieldtrip on precious metal deposits of San Juan volcanic field, Colorado.

Staff involvement in executive activity of professional societies included the following:

Canadian Institute of Mining and Metallurgy--J. G. McArthur, Vice-Chairman, Victoria Section

Geological Association of Canada--D. G. MacIntyre, Chairman, Victoria Section
Canadian Geoscience Council--A. Sutherland Brown, President
Commmittee of Provincial Geologists--A. Sutherland Brown, Secretary
British Columbia Association of Professional Engineers--W. J. McMillan, Councillor
Analytical Chemistry Division of Chemical Institute of Canada--W. M. Johnson

PUBLICATIONS

The work of the branch is brought to the attention of the interested public, principally the exploration sector of the mineral industry, by a series of formal publications by the Ministry and by scientific journals, and also, by informal talks and person-to-person consulation.

Ministry geoscience publications released during 1982 included:

BULLETINS

Bulletin 64--*Porphyry Copper and Molybdenum Deposits of West Central British Columbia,* by N. C. Carter

PAPERS

Paper 1982-1--*Geological Fieldwork, 1981*
Paper 1981-3--*Correlation of Lower Cretaceious Coal Measures of Peace River Coalfield, British Columbia,* by P. McL. D. Duff and R. D. Gilchrist

PRELIMINARY MAPS AND NOTES

Preliminary Map 48--*Geology of the Kamloops Group near Kamloops (92I/NE),* by T. Ewing (1:50 000)
Preliminary Map 49--*Geology of the Moyie Lake Area, Purcell Mountains, Southeastern British Columbia (82G/W),* by T. Höy and L. Diakow (1:50 000)
Preliminary Map 50--*Geology of the Akie River Ba-Pb-Zn Mineral District (94F/1, 2),* by D. G MacIntyre (1:50 000)

MISCELLANEOUS MAPS

Geology of the Unuk River-Salmon River-Anyox Area (103O, P and 104A, B), by E. W. Grove, three coloured maps and sections

Faults, Tectonic Belts and Thermal Springs of the Canadian Cordillera, Map D, a transparent overlay for Geological Map of British Columbia

REGIONAL GEOCHEMICAL SURVEYS

BC RGS-7, Hope, 92H
BC RGS-8, Ashcroft, 92I
BC RGS-9, Pemberton, 92J

Maps and data regularly updated in the following series are available:

Mineral Inventory Maps (issued as ozalid prints)--show location and commodities of all known mineral occurrences

Mineral Assessment Report Index Maps--show the location and number of reports accepted for assessment credit by the Ministry

MINFILE--a revised and updated output of MINFILE made available during 1981

Main papers published in external technical journals and for technical meetings in 1982 include the following:

Höy, T.: The Purcell Supergroup in Southeastern British Columbia: Sedimentation, Tectonics and Stratiform Lead-Zinc Deposits, R. W. Hutchinson, C. D. Spence, and J. M. Franklin, editors, *Geol. Assoc. Canada*, Special Paper 25, pp. 127-147

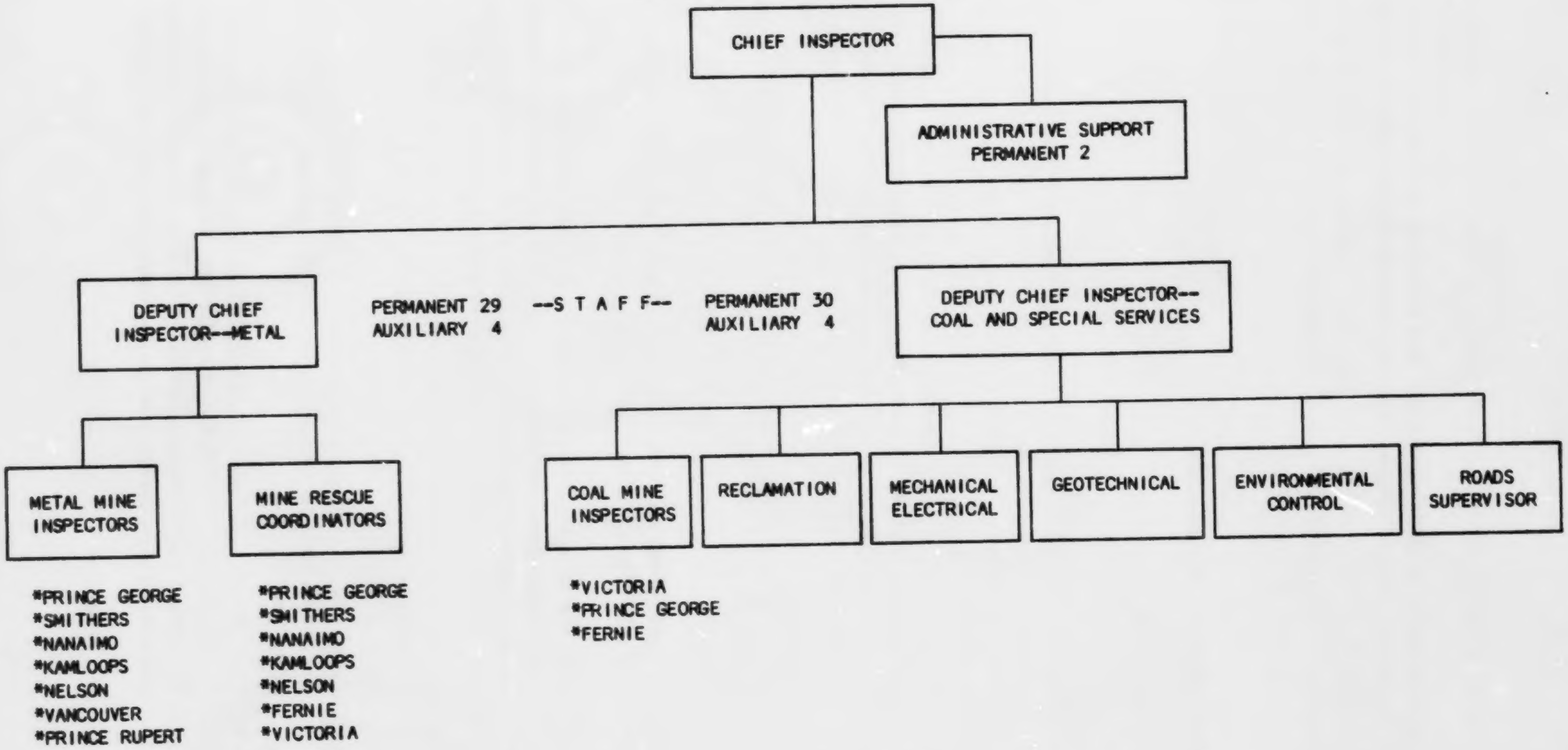
Höy, T.: Stratigraphic and Structural Setting of Stratabound Lead-Zinc Deposits in Southeastern British Columbia, *CIM*, Bull., Vol, 75, pp. 114-134

MacIntyre, D. G.: Geologic Setting of Recently Discovered Stratiform Barite-Sulphide Deposits in Northeast British Columbia, *CIM*, Bull., Vol. 75, pp. 99-113

McMillan, W. J.: Behaviour of Uranium, Thorium and other Trace Elements During Evolution of the Guichon Creek Batholith, British Columbia, *in* Uranium in Granites, Y. T. Maurice, editor, *Geol. Surv., Canada*, Paper 81-23, pp. 49-54

TABLE 2-7. ORGANIZATION CHART

INSPECTION AND ENGINEERING BRANCH


CHIEF INSPECTOR
ADMINISTRATIVE SUPPORT PERMANENT 2
DEPUTY CHIEF INSPECTOR--METAL
PERMANENT 29
AUXILIARY 4
--STAFF--
PERMANENT 30
AUXILIARY 4
DEPUTY CHIEF INSPECTOR--COAL AND SPECIAL SERVICES
METAL MINE INSPECTORS
MINE RESCUE COORDINATORS
COAL MINE INSPECTORS
RECLAMATION
MECHANICAL ELECTRICAL
GEOTECHNICAL
ENVIRONMENTAL CONTROL
ROADS SUPERVISOR
*PRINCE GEORGE
*SMITHERS
*NANAIMO
*KAMLOOPS
*NELSON
*VANCOUVER
*PRINCE RUPERT
*PRINCE GEORGE
*SMITHERS
*NANAIMO
*KAMLOOPS
*NELSON
*FERNIE
*VICTORIA
*VICTORIA
*PRINCE GEORGE
*FERNIE

BUDGET	MANAGEMENT	METAL MINES	COAL AND SPECIAL SERVICES	BRANCH TOTAL
1982/83	$434.9	$1 490.3	$1 460.1	$3 385.2

INSPECTION AND ENGINEERING BRANCH

OBJECTIVES AND ORGANIZATION

The Inspection and Engineering Branch carries out many activities in order to provide safe operations at all mines, to ensure worker health and safety, to ensure the suitable reclamation and conservation of land affected by mining and exploration, and to ensure mining systems provide the maximum possible economic recovery of the mineral and coal resources. Most activities are required and carried out under the *Mining Regulation Act* and the *Coal Mine Regulation Act*. The branch also administers the coal and metal guidelines process.

The branch, under the direction of Chief Inspector W. C. Robinson, is organized as shown in Table 2-7. Coal mines, metal mines, sand and gravel pits, placer mines, and quarries were inspected during the year, in accordance with the *Mining Regulation Act* and the *Coal Mine Regulation Act*, by inspectors stationed at various locations. Specialized research and support for field inspections was provided by Victoria-based professionals in the areas of reclamation, environmental control, geotechnical engineering, mechanical/electrical engineering, and coal mining. The development and maintenance of access roads into areas of promising mineral potential is administered by a roads supervisor. Mine-rescue training is a continuous program administered by coordinators for areas in which mine-rescue stations are located.

STAFF

On December 31, the staff included 59 permanent and 8 auxiliary employees.

STAFF CHANGES

Early in 1982, S. J. Hunter was transferred from Smithers to the Vancouver office as Inspector of Mines and R. W. McGinn commenced employment as Inspector of Mines and Resident Engineer.

In April, B. Varkonyi resigned from the staff as Inspector-Technician in Prince Rupert.

In May, S. Ghoneim joined the Ministry as Environmental Control Inspector in Prince George.

In May, W. H. Childress retired from the staff as Inspector-Technician in Vancouver.

In August, F.J.T. Hancock commenced employment with the Ministry as Inspector of Mines in Prince Rupert.

In September, G. J. Lee retired from the staff as Senior Coordinator, Mine Rescue Training.

In October, R. Bone transferred from Fernie to Victoria as Inspector of Mines.

In October, a tragic vehicle accident claimed the life of D. Pearce, Office Technician.

In October, A. Whale joined the staff in Fernie as Inspector of Mines and in December, R. Booth commenced employment in Fernie as Inspector of Mines.

In December, D. Turner joined the staff as Inspector of Mines in Prince George.

MINE INSPECTION AND SAFETY

It is the responsibility of the Inspection and Engineering Branch, under the provisions of the *Mining Regulation Act* and the *Coal Mine Regulation Act*, to ensure that the maximum possible recovery of natural resources from mining operations is achieved while keeping personal injury and environmental disturbance to a minimum. The branch maintains a province-wide network of district offices staffed by experienced professional personnel supported by a team of specialist engineers based in Victoria.

Inspections were carried out at metal mines, coal mines, sand and gravel pits, placer mines, and quarries throughout the province on a regular basis by the inspection staff.

Every employee working in an underground coal mine or in open-pit workings is required to be under the supervision of a person holding an appropriate certificate of competency issued in accordance with the *Coal Mine Regulation Act* or the *Mining Regulation Act*. In order to obtain a certificate, a candidate has to pass an examination administered by either the coal mine or the metal mine Board of Examiners. These Boards are appointed from the branch staff and are responsible for ensuring that candidates meet the required standards of training and education.

In addition, miner's certificates, coal miner's certificates, and blaster's certificates are issued by the Inspector of Mines in the district offices.

The following is a review of the work of the various sections of the Inspection and Engineering Branch during the year.

COAL SECTION

MINE INSPECTION AND SAFETY

The Coal Section of the Inspection and Engineering Branch was responsible for carrying out inspections of all developing and operating mines and exploration sites. All fatal and non-fatal accidents were investigated, together with all reported dangerous or unusual occurrences. The investigations were made to establish the causes and make recommendations to prevent, or reduce, the occurrence of similar accidents or incidents at mines in the province. Environmental conditions at coal mines were monitored by Environmental Inspectors. Special attention continued to be paid at areas where there was likely to be noise, dust, or ventilation problems.

MINE QUALIFICATIONS

The following persons formed the Board of Examiners:

V. E. Dawson, P.Eng., Deputy Chief Inspector (Coal and Special Services), Victoria
H. J. Dennis, P.Eng., Senior Inspector of Mines (Coal)
T. Vaughan-Thomas, P.Eng., Inspector of Mines and Resident Engineer, Prince George

The board was responsible for conducting examinations for the granting of first, second, and third class certificates of competency, mine surveyor certificates and shiftboss certificates issued under the *Coal Mine Regulation Act*. Inspector of Mines and Resident Engineers for the Districts continued to conduct examinations for and issue permanent miner's and blasting certificates. The last successful examinations for First and Second Class Certificates were in 1977 and 1976 respectively. During 1982, due to the lack of applicants in recent years, the management of underground operations were approached to provide a stimulus to motivate individuals to present themselves for examination. Probably as a result of this, three persons applied for First Class Certificates of Competency and two applied for the Second Class Certificate. In addition there were two applications from persons wishing to write the examination for a surveyor's certificate.

MINING PROJECTS

Mining proposals for new and existing coal mines were received from Denison Mines Ltd. (Quintette mine), Teck Corporation (Bullmoose mine), B.C. Coal Ltd. (Balmer and Greenhills operations) and Crows Nest Resources Ltd. (Line Creek mine). The Chief Inspector granted the necessary approvals under the *Coal Mine Regulation Act*, following review of each proposal by members of his staff.

In addition Stage I reports for Cinnabar Peak surface mine and Willow Creek underground mine were also accepted during the year.

ACCIDENT STATISTICS

There was one fatal accident at coal mines during the year. This occurred at a mine under construction in the Northeast Coalfield. In 1981 there was one fatal accident at an open-pit operation and one at an underground mine.

The combined accident statistics for underground and open pit operations are shown below for the last four years.

YEAR	TOTAL HOURS WORKED	SEVERITY RATE*	TOTAL WORK DAYS LOST
1979	6 113 442	179	5 458
1980	6 238 474	106	3 321
1981	7 188 197	437	15 720**
1982	7 812 224	120	4 684***

*Severity Rate = $\frac{\text{Total days lost} \times 200\ 000}{\text{Total Hours Worked}}$

**12 000 for two fatalities

***A fatal accident which occurred at a mine under construction not included in figures

NOTE: Accidents occurring during construction are not included in these figures.

There were 294 compensable accidents in 1982 compared with 242 in 1981. The highest single injury cause was slips and falls. This category was down from 176 in 1981 to 158 in 1982 for the mining industry as a whole.

ENVIRONMENTAL CONTROL SECTION

The Environmental Control Section is responsible for the monitoring and maintenance of safe working conditions in mine atmospheres with respect to dust, gases, noise, and radiation.

Monitoring of dust, ventilation, and noise conditions continued at most mining operations and, in addition, two radiation surveys were made for radon daughter elements and gamma radiation at one underground mine. In instances where environmental conditions were found to be unsatisfactory, management was requested to take remedial action. Audiometric testing of mine employees was continued at most mining operations. Cooperation from mine management and employees has been good.

GEOTECHNICAL SECTION

1982 was the second full year in which geotechnical engineering work was carried out.

Most of the work dealt with urgently needed approvals of stability-related submissions for both existing and proposed mines. A total of 27 applications for approval were reviewed. Two were denied, and no further action was required on another two. Of the 23 remaining applications that were recommended for approval by this section, 21 were granted by the Chief Inspector. In comparison, only 19 geotechnical approvals were issued in the previous year.

As a consequence of the emphasis on approvals, the number of inspections of geotechnical features decreased in 1982. Only 12 mining projects were visited this year whereas in 1981, 25 had been visited. Similarly, only 19 geotechnical features were inspected in 1982 compared to 35 in the previous year.

Of the 25 active tailings impoundments only two were known to have experienced difficulties in 1982. No failures, or breaches, occurred but one impoundment which had experienced a minor failure beforehand was repaired and allowed to resume normal operation. Both difficulties occurred early in the year and involved unlicensed discharges from tailings impoundments at the Carolin mine on Ladner Creek near Hope and at the Bell mine near Granisle.

There were two major failures of waste dumps but fortunately no loss of life or appreciable damage resulted. Both of these failures occurred near the middle of the year at the Line Creek mine and at the Balmer mine, near Sparwood.

MECHANICAL/ELECTRICAL SECTION

The section's main function is to assure mine safety by approval of new mechanical/electrical equipment and installations, continuing inspection of these, and investigation and analysis of accidents to prevent re-occurrence. Several new mine shafts were in the process of development during the year and a good deal of time was spent in inspecting sinking hoists and new hoist installations; including both drum and friction hoists. Many new model haul trucks, in excess of 50 000 kilograms gross vehicle weight, were approved for use at mines; acceptance of such vehicles is dependent upon a rigorous examination of engineering data together with witnessing of high-speed downhill braking tests. A substantial amount of time was spent with coal companies, engineers, contractors, and others regarding the northeast coal development. The section was extensively involved with both Quintette and Bullmoose operations regarding the introduction of mechanical and electrical equipment into the proposed mines and coal preparation plants in the Northeast Coalfield. Much of this work was concerned with the use of electrical equipment in hazardous locations in the mines and associated plants.

To better fulfill its functions the staff of the branch have organized symposia and taken part in national technical committees concerned with mechanical/electrical equipment and safety. A mechanical/electrical symposium, sponsored by this branch of the Ministry, was held during February at the Harbour Towers Hotel in Victoria. Well over 100 persons attended the symposium and a volume containing the proceedings was issued. Three technical papers were given by the staff at this symposium and another at the Mines Accident Prevention Association of Ontario in Toronto. Two mechanical members and one electrical member of the staff actively serve on Canadian Standards Association technical committees. In addition, the section was represented at the monthly meetings of the Mobile Equipment Committee of British Columbia which is instrumental in bringing together and formulating the views of all regulatory bodies in the province regarding the use of mobile equipment.

RECLAMATION SECTION

The regulation of reclamation of lands disturbed by mining is under the authority of section 10 of the *Mining Regulation Act* and section 9 of the *Coal Mine Regulation Act*. The objective of all reclamation programs is to restore lands disturbed by mining or exploration to a state compatible with adjacent land use values. Reclamation permits are required prior to any surface disturbances at a mine and are issued for metal mines, coal mines, mineral exploration, coal exploration, sand and gravel pits, quarries, and placer mines. As a condition of a reclamation permit, a security deposit is required to ensure that the reclamation program is adequately completed.

During the year a total of 225 applications were received of which a total of 189 new reclamation permits (2 metal, 0 coal, 23 mineral exploration, 0 coal exploration, 33 sand and gravel, 5 quarries, and 126 placer mines) were issued. At year end a total of 1 000 reclamation permits were in existence.

The 47 active metal mines reported a total area disturbed by mining of 14 103 hectares of which 1 879 hectares were reclaimed. The 5 active coal mines and 37 exploration sites reported a total disturbance of 7 652 hectares of which 2 646 hectares were reclaimed.

A booklet was issued during 1982 entitled *Guidelines for Mineral Exploration* that outlines the requirements for conducting mineral exploration in British Columbia in compliance with the mining legislation and with due regard for the province's other resources.

The sixth annual British Columbia Mine Reclamation Symposium sponsored by the Ministry of Energy, Mines and Petroleum Resources and Mining Association of British Columbia was held in March. One hundred seventy-five participants heard a variety of presentations on many aspects of mine land reclamation. During the symposium the annual British Columbia Mine Reclamation award was presented to Crows Nest Resources for their Line Creek operations. The citation for reclamation of exploration disturbance was presented to Fording Coal Ltd., for reclamation of metal mining disturbance to Cominco Ltd. for its work at Pinchi Lake, and for reclamation of coal mine disturbance to B.C. Coal Ltd.

MINE RESCUE AND FIRST AID

Mine-rescue stations manned by qualified mine rescue coordinators are maintained at Fernie, Nanaimo, Kamloops, Smithers, Nelson, and Prince George. The stations are equipped with sufficient self-contained (oxygen-supplying) breathing apparatus to maintain two underground mine-rescue teams of six men each. In addition, each station has auxiliary equipment such as Type 'N' gas masks, gas detectors, oxygen therapy units, and first-aid equipment.

In order to service the open pits, quarries, and gravel-pit mining operations with rescue training, the stations are equipped with auxiliary equipment such as ropes, stretchers, and apparatus for dealing with avalanche and vehicle rescue equipment.

The Ministry occasionally provides equipment on loan to various companies in order to supplement their own.

The mine-rescue coordinator's responsibilities include annual and semi-annual fieldtrips to mining properties to conduct inspections of mine-rescue and first-aid equipment and supplies.

Despite funding and staff reductions at Prince George and Victoria, mine-rescue coordinators and inspectors have increased their personal work load in order to continue rescue and first-aid training to mining personnel throughout the province. In fact, there was a 6-per-cent increase in the number of personnel trained in mine rescue and first aid in the mining industry this year.

The type of training courses and the number trained, assisted, or examined by the mine rescue coordinators in 1982 combined with comparable statistics for 1981 are as follows:

	1981	1982
Underground Mine Rescue Certificates	187	198
Underground Mine Rescue (Refreshers)	21	21
Surface Mine Rescue Certificates	223	390
Surface Mine Rescue (Refreshers)	52	44
Survival Mine Rescue Certificates	685	308
Gravel Pit Mine Rescue Certificates	31	19
Gravel Pit Mine Rescue (Refreshers)	-	2
St. John Standard First Aid	238	360
St. John Safety Orientated First Aid	139	294
Industrial First Aid	10	-
Underground Instructor's Certificates	-	1
Surface Instructor's Certificates	26	1
Survival Instructor's Certificates	2	1

The underground mine rescue manual is currently being revised and upgraded to keep abreast of technological changes.

MINE SAFETY ASSOCIATIONS

The three mine safety associations still active throughout the province are to be commended for their efforts in promoting mine-rescue and first-aid training, and safety education within their respective zones.

The associations are as follows:

Vancouver Island Mine and Industrial Safety Association
East Kootenay Mine and Industrial Safety Association
West Kootenay Mine and Industrial Safety Association

The Central British Columbia Mine Safety Association is presently inactive. However, the responsibility of administering the zone mine rescue and first aid competitions is presently being conducted by the various competing mines within each zone--north, south, and central. A host mine is selected from competing mines within each zone on an annual alternating basis.

The associations are assisted by this Ministry and the Workers' Compensation Board. The association members consist of representatives from industry, the Inspection and Engineering Branch, the Workers' Compensation Board, and St. John Ambulance. One of the important functions of each association is to administer the zone competitions.

The mine-rescue competitions serve to extend the teams' training and experience in protecting themselves, saving lives and protecting mine property during simulated disaster conditions.

The winners of the various zones went on to compete in the provincial competition in Nanaimo on June 19, 1982. The zone winners were as follows:

ASSOCIATION	UNDERGROUND	OPEN PIT	THREE PERSON FIRST AID
Vancouver Island Mine and Industrial Safety Association	Westmin Res. Ltd. Captain-- H. Uhrig	No Entry (Island Copper moved into south zone)	Erickson Gold Mining Corp. Captain--J. Bondeson
Central B.C. Mine Safety Association			
--North Zone	No Entry	Equity Silver Mines Captian--G. Andrews	Equity Silver Mines Captain--R. Burri
--South Zone	No Entry	Utah Mines Ltd. (Island Copper mine) Captain--J. Pelletier	Utah Mines Ltd. (Island Copper Mine) Captain--A. Thurgood
--Central Zone	No Entry	Bethlehem Copper Corp. Captain--J. Crookes	Lornex Mining Corp. Captain--A. Smith
West Kootenay Mine and Industrial Safety Association	Cominco Ltd. (Sullivan Mine 2) Captain--R. Gyurkovits	No Entry	No Entry
East Kootenay Mine and Industrial Safety Association	B.C. Coal Ltd. (Sparwood) Captain--D. Saunders	B.C. Coal Ltd. (Sparwood) Captain--E. Hingston	Cominco Ltd. (Sullivan Mine) Captain--A. Wilson

The winners of the provincial mine-rescue and three-person first-aid events were as follows:

ZONE	UNDERGROUND	OPEN PIT	THREE PERSON FIRST AID
West Kootenay	Cominco Ltd. Sullivan Mine 2		
Southern		Utah Mines Ltd. (Island Copper mine)	
Vancouver Island			Erickson Gold Mining Corp.

The Canadian Underground Mine Rescue Competition was hosted by British Columbia at Beacon Hill Park on June 26, 1982 in Victoria. Seven provinces and/or territories participated in the competition with team representation from the following: Alberta, British Columbia, Nova Scotia, Northwest Territories, New Brunswick, Saskatchewan, and Yukon.

The team from PCS Mining Limited, Lanigan Division, Saskatchewan, took top honours in the event.

MINING ROADS

The Ministry of Energy, Mines and Petroleum Resources' road maintenance program continued during 1982 under the authority of the Ministry of Energy, Mines and Petroleum Resources Act. The purpose of the program was to encourage and assist in the development of mineral and fossil fuel resources in the province.

During 1982 an expenditure of $316 639.12 was made to provide annual general maintenance to the Omineca road, for limited maintenance of the Takla Spur access road, and to construct a new bridge across Upper Lay Creek.

A total of $186 138.00 was spent on the Sierra-Yoyo all-weather road to maintain access to the main gas producing area east of Fort Nelson. This work included fill replacement due to washouts, extensive gravelling, and culvert repairs.

Due to budgetary restraints in 1982, the shared-cost road grant program to assist in construction or maintenance of roads or trails to mining properties was discontinued.

MINE DEVELOPMENT GUIDELINES

The Inspection and Engineering Branch is responsible for the day-to-day administration of the *Procedures for Obtaining Approval of Metal Mine Development* (April 1979) and the *Guidelines for Coal Development* (March 1976), responsibility for the latter having been assigned to the Branch in late 1980. The Branch provides the chairman, Vice-Chairman, and Secretary for both the Metal Mines Steering Committee and the Coal Guidelines Steering Committee.

The year 1982 was not very active for the Metal Mines Guidelines Review Process, reflecting depressed metal markets. Four "large" mines were at various stages in the review process; five mines were designated "small", and are now at the licencing stage (Stage III):

GUIDELINES FOR COAL DEVELOPMENT (MARCH 1976)

PROJECT	COMPANY	STATUS AT END OF 1982
Bullmoose	Bullmoose Operating Corp.	In Stage III
Byron Creek	Byron Creek Collieries Ltd.	Detailed project assessment in preparation on expansion
Carbon Creek	Utah Mines Ltd.	In Stage II
Cinnabar Peak	Cinnabar Peak Mines Ltd.	In Stage II
Elk River	Elco Mining Ltd.	In Stage III (dormant)
Fording	Fording Coal Ltd.	Detailed project assessment in preparation on expansion
Hat Creek Thermal	B.C. Hydro & Power Authority	Review of Environmental Impact Statement almost finalized
Line Creek	Crows Nest Resources Ltd.	Detailed project assessment in preparation on expansion
Monkman	Petro-Canada	In Stage III
Quinsam	Brinco/Weldwood	Stage II submission under review
Quintette	Denison Mines Ltd.	In Stage III
Sage Creek	Sage Creek Coal Ltd.	Stage II submission under review
Sparwood Operations	Westar Mining Ltd. (formerly B.C. Coal Ltd.)	Mine system modifications under review
Willow Creek	David Minerals Ltd.	Stage II submission under review
Wolf Mountain	Wolf Mountain Management Ltd.	Stage I submission under review

The Coal Guidelines Review Process was active with 11 mines in the review process. Three companies received approval-in-principle of their Stage II reports and two filed Stage II reports. Two companies received approval of their Stage I reports and were proceeding to Stage II. Four companies were in various phases of mine extensions or expansions:

PROCEDURES FOR OBTAINING APPROVAL OF METAL MINE DEVELOPMENT (APRIL 1979)

PROJECT (PRODUCT)	COMPANY	STATUS AT END OF 1982
Adanac (Mo)	Placer Development Ltd.	At end of Stage II
Ashlu (Au)	Osprey Mining & Exploration Ltd.	In Stage III
Banbury (Au)	Banbury Gold Mines Ltd.	Close to end of Stage I
Blackdome (Au/Ag)	Blackdome Exploration Ltd.	In Stage I
Bralorne (Au)	Bralorne/E&B Explorations Ltd.	In Stage I
Cinola (Au)	Cinola Operating Co. Ltd.	In Stage II
HB Mill (Au)	David Minerals Ltd.	In Stage III
Kutcho Creek (Cu/Zn)	Sumac/Esso	In Stage I
Rossland (Au/Co/Mo)	David Minerals Ltd.	Stage I submission under review
Valley (Cu)	Valley Copper Mines Ltd.	Mining system being revised in Stage III
Westmin (Pb/Zn)	Westmin Resources Ltd.	Stage II submission under review

MINERAL ECONOMICS BRANCH

OBJECTIVES AND ORGANIZATION

The branch provides economic, financial and statistical analyses pertaining to provincial mineral sector policy, legislation, and planning, and also collects, maintains and disseminates comprehensive statistical data in support of Ministry resource management responsibilities. These major objectives are further delineated as follows:

- The provision of expertise on the economic aspects of mineral sector policy and planning including assistance on the formulation of incentive programs, infrastructure support programs, taxation and tenure systems, appropriate evaluation frameworks, and provincial and intergovernmental mineral policies;
- The conduct of selected mineral industry economic analyses including marketing, supply, financial, economic, and fiscal evaluations of mineral projects and government programs, and environmental-economic and socio-economic assessments; and
- The collection, maintenance and dissemination of comprehensive British Columbia mineral industry statistics for use by the Branch, the Ministry, and other users, covering producing metal, coal, industrial minerals, structural materials, and placer operations, and associated production, sales, and values of commodities produced from these operations.

The Mineral Economics Branch is currently organized, under the Director, into four groups: Administrative Support, Economic and Financial Analysis, Mineral Policy, and Mineral Statistics. The functions of the groups are summarized in Table 2-8.

Table 2-8.
MINERAL ECONOMICS BRANCH

MINERAL POLICY	ECONOMIC AND FINANCIAL ANALYSIS	MINERAL STATISTICS
Information and analysis of mineral policies in: --British Columbia --Other provinces --Federal government --Internationally	Analysis of coal and metal mine projects under guideline procedures	Collection, compilation, analysis, and dissemination of monthly and annual statistics for the sector
Development of policy and program evaluations	Development of commodity studies for British Columbia minerals	Provision of statistical support for branch, division, and ministry
Analysis of impacts on British Columbia mining sector of international trade, tariff, and investment policies	Development of commodity production and price forecasts for the provincial mineral sector	Publication of quarterly bulletin of mineral statistics
Liaison with federal and provincial governments on mineral policy	Analysis of fiscal and tax measures on the mining sector	Assembly of statistical material for ministry annual report

STAFF AND STAFF CHANGES

During the year, John Clancy continued in his capacity as Acting Director of the Branch.

Josephine Harris resigned her position as Office Manager in February to join the Ministry's Communications Branch as a Public Information Officer. Signy Thorleifson was appointed Acting Office Manager at that time, assuming the duties of both secretarial positions for the branch.

Linda Nutter resigned her auxiliary position as Senior Economic Analyst in March. She was rehired on a contract basis from the beginning of July until the end of October in order to undertake a study on placer mining in the province of British Columbia.

With supervision from Klaus Brueckl, Paula Moniz was hired as a summer student for July and August to prepare tables of production statistics by mine (1960-1981) for eventual use in a computerized input/output data analysis system.

With supervision from Philippe Monier, Bruce Wilby was contracted under the Cooperative Education Employment Program from January until April. He developed a set of functions to achieve tax minimization for projects analysed with COALMOD. During his term he wrote two papers entitled *Taxation of Coal Mining Projects in British Columbia* and *TAXMIN - A Guide for Programmers*.

Klaus Brueckl was appointed Division Coordinator for the Mineral Resources Division in December. His duties in this position are in addition to his responsibilities as Research Officer for the branch.

During the year the remainder of the permanent staff of the branch was unchanged.

REVIEW OF ACTIVITIES

Major activity areas for the branch during the year included the evaluation of new coal and metal projects under the *Guidelines for Coal Development* and *Procedures for Approval of Metal Mine Development*, pursuant to infrastructure assistance and benefit cost analysis of prospective coal and metal projects in several regions. Concurrent with these evaluations, efforts were also directed toward the continuing refining and updating of COALMOD and MINSIM, the Ministry's computerized financial and economic evaluation systems for coal and metal mining projects respectively.

An important achievement this year was the birth of a quarterly publication entitled *B.C. Mineral Quarterly*, which contains economic and statistical data on the British Columbia mining industry, as well as timely information on programs and activities of the Mineral Resources Division. The mailing list rose to over 500 copies per issue by the end of the year.

Major studies undertaken by the branch this year were:

- Economics of Coal Production in British Columbia
- Placer Mining in British Columbia
- Phase 2 of the Mining Statistics Project
- A Study of Pacific Rim Markets

The branch carries out research and analysis and prepares reports, briefing documents, and cabinet submissions on a wide range of topics. Among the studies undertaken by the Economics and Financial Analysis group this year were:

- Financial analyses of nine northwest British Columbia metal and coal mining projects
- A detailed study of the 1981 operating costs of 20 major British Columbia metal mines
- A detailed financial analysis of the Quinsam coal-mining project
- Presentation of a seminar on project analysis models
- Development of a set of functions to achieve tax minimization for projects analysed with COALMOD
- Cost analysis and programming enhancements to reduce the cost of running the sector's financial simulation models (MINSIM and COALMOD) and of storing various workspaces and files

The main reports produced by the Economics and Financial Analysis group in 1982 are as follows:

- Taxation of Coal Mining Projects in British Columbia
- TAXMIN - A Guide for Programmers
- Summary of a Seminar on Project Analysis Models

The Mineral Policy group developed a policy framework for development of a provincial mineral policy during 1982. It also continued its federal-provincial liaison on policy-related matters via participation in the task force on mining communities and the preparation of British Columbia's response to the federal mineral policy paper. Analytical support and projection of mining production were provided to the province's economic development plan for the northwest region as well as land use planning efforts in areas such as the Slocan Valley and Columbia-Windermere. Major studies undertaken by the group include:

Identification of mining projects suitable for participation in the Federal New Employment Expansion and Development program (NEED), and the province's own employment development program

An overview of potential and existing mines in British Columbia

Mining industry outlook

Extensive reviews on matters with policy implications include:

Sand and gravel resource management
B.C. Securities bill
Provincial procurement policy
Ministry land use policy and strategy

The Mineral Statistics group's activity during the year included assembly and dissemination, on a monthly and annual basis, of the survey, collection, editing, and compilation of all mineral production activity and data for the province. Staff in the group participate regularly in joint consultative efforts with other governments to streamline the data collection process and improve the accuracy and validity of mineral statistical reports. The branch completed its planning and programming for computerization of the monthly metal mine surveys, through the MINSTATS project. This work has resulted in a much improved and more timely statistical reporting system.

BUDGET

The budget for the Mineral Economics Branch in 1982 was $465 773.

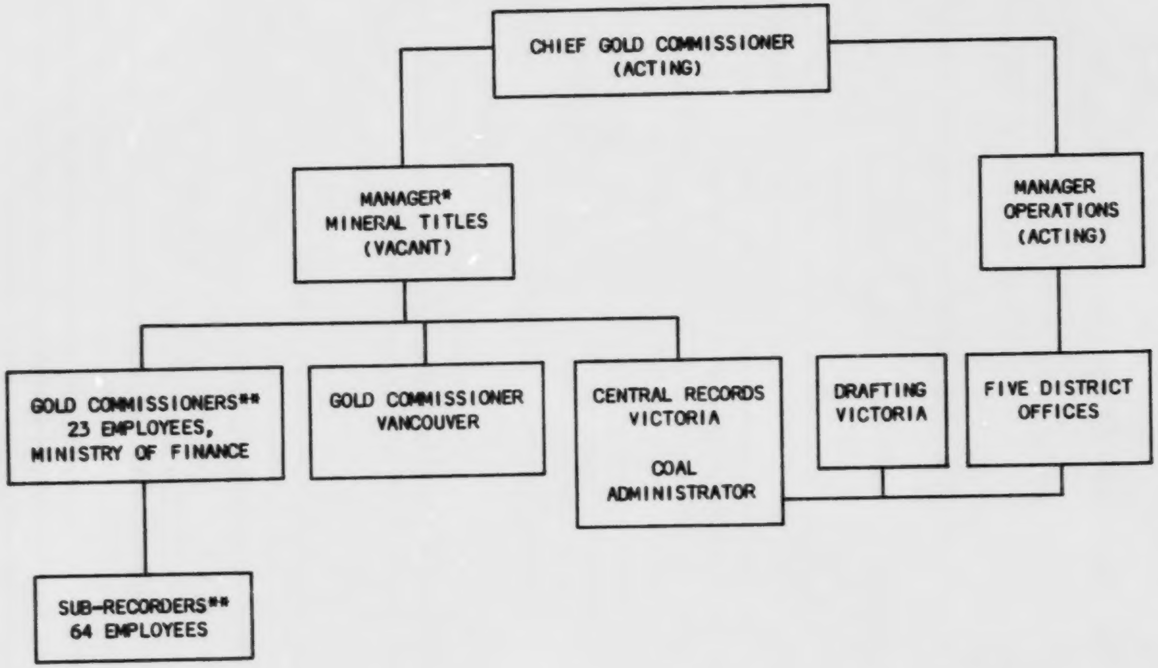
MINERAL TITLES BRANCH

ORGANIZATION AND OBJECTIVES

The Mineral Titles Branch of the Mineral Resources Division is under the direction of the Chief Gold Commissioner and is responsible for the administration of the provincial laws relating to the acquisition of minerals and coal.

Table 2-9. Organization, Manpower, and Budget

MINERAL TITLES BRANCH


CHIEF GOLD COMMISSIONER (ACTING)
MANAGER* MINERAL TITLES (VACANT)
MANAGER OPERATIONS (ACTING)
GOLD COMMISSIONERS** 23 EMPLOYEES, MINISTRY OF FINANCE
GOLD COMMISSIONER VANCOUVER
CENTRAL RECORDS VICTORIA
COAL ADMINISTRATOR
DRAFTING VICTORIA
FIVE DISTRICT OFFICES
SUB-RECORDERS** 64 EMPLOYEES

							MANAGEMENT	BRANCH TOTAL
STAFF:								
PERMANENT	-		11	11	9	6	3	40
PERMANENT VACANT	-		1	3	1	1	2	8
ACTING/SUBSTITUTE	-		0	2	0	0	1	3
AUXILIARY	-		2	4	0	1	0	7
BUDGET 82/83	-		217 838	279 878	220 700	197 616	237 004	1 153 036

*BUDGETING FOR THIS POSITION CURRENTLY UNDER REVIEW
**BY STATUTE SECTION 56(2) MINERAL ACT, THESE EMPLOYEES UNDER GENERAL SUPERVISION OF CHIEF GOLD COMMISSIONER

Branch activities can be summarized as follows:

- Responsible for the issuance and management of all mineral, placer, and coal title records
- Develop and prepare appropriate mining titles legislation
- Resolve titles disputes
- Provide claim map service and information
- Provide claims inspection service
- Maintain current mineral record information through 24 district offices
- Provide prospector education material and lectures

REVENUE AND BUDGET

The branch was responsible for collection of $4 178 169 from lode and placer fees and receipts and $2 975 539 from coal fees and rentals.

The branch budget in 1982 was $1 153 036.

STAFF

The senior staff of the division was depleted through retirement during the year and most of the senior positions were filled by persons in an acting capacity.

David Doyle who was Gold Commissioner, Vancouver, acted as Chief during much of the year but died suddenly in November. Ray Rutherford, a former Chief Gold Commissioner, returned under contract to act until the end of the year.

REVIEW

The administration and procedures of the Mineral Titles Branch were subject to a review by Price Waterhouse Associates beginning in September with a mandate to report early in 1983.

ORGANIZATION AND FUNCTION

The organization, manpower, and details of the branch in 1982 are shown on Table 2-9.

GOLD COMMISSIONERS

Gold Commissioners and Sub-recorders are appointed for the 24 mining divisions throughout the province and their duties are specified in writing by the Chief Gold Commissioner (Table 2.10).

Table 2.10.

GOLD COMMISSIONERS

MINING DIVISION	TELEPHONE NUMBER	ADDRESS	NAME
Alberni	723-3501	4515 Elizabeth St., Port Alberni V9Y 6L5	W. G. Mundell
Atlin	651-7577	Box 100, Atlin V0W 1A0	P. S. Welock
Cariboo	992-5591	102, 350 Barlow Ave., Quesnel V2J 2C1	R. Campbell
Clinton	459-2268	Box 70, Clinton V0K 1K0	E. J. Johnstone
Fort Steele	489-3521	102 - 11th Ave. South, Cranbrook V1C 2P2	W. R. Anderson
Golden	344-5221	Box 39, Golden V0A 1H0	J. Olson
Greenwood	442-8642	Box 850, Grand Forks V0H 1H0	S. Matsuo
Kamloops	372-5233	Court House, Kamloops V2C 1E5	W. Poohachoff
Liard	387-1385	412 Douglas Building, Victoria V8V 1X4	D. Doyle (Acting)
Lillooet	256-7548	Box 70, Lillooet V0K 1V0	R. E. Hall
Nanaimo	754-2111	Court House, Nanaimo V9R 5J1	R. W. Hansen
Nelson	352-2211	310 Ward Street, Nelson V1L 5S4	E. McParlon
New Westminster	525-0375	100, 635 Columbia St., New Westminster V3M 1A7	T. G. Townsend
Nicola	378-6141	Box 339, Merritt V0K 2B0	L. P. Lean
Omineca	847-4411	Bag 5000, Smithers V0J 2N0	D. McMillan
Osoyoos	493-1719	Room 112, Court House, Penticton V2A 5A5	L. D. Sands
Revelstoke	837-3222	Box 380, Revelstoke V0E 2S0	D.G.B. Roberts
Similkameen	295-6957	Box 9, Princeton V0X 1W0	W. L. Marshall
Skeena	624-2121	Court House, Prince Rupert V8J 1B7	Mrs. L. Finnigan
Slocan	353-2219	Box 580, Kaslo V0G 1M0	Mrs. J. James
Trail Creek	362-7324	Box 910, Rossland V0G 1Y0	A. D. Sherwood
Vancouver	668-2672	800 Hornby St., Vancouver V6Z 2C5	Rick Conte (Acting)
Vernon	545-2387	Court House, Vernon V1T 4W5	N. G. Schulz
Victoria	385-1385	412 Douglas Building, Victoria V8V 1X4	D. Doyle (Acting)

CLAIMS INSPECTORS

992-5591	401, 350 Barlow Ave., Quesnel V2J 2C1	Dennis Lieutard
847-4411	Box 877, Smithers V0J 2N0	Tom Jones
668-2672	800 Hornby St., Vancouver V6Z 2C5	Rick Conte
554-1445	212, 2985 Airport Drive, Kamloops V2B 7W8	Howard Turner
382-2211	403 Vernon Street, Nelson V1L 4E6	Derek Moule

The recording of locations and of work on mineral claims, as required by the *Mineral Act*, and the recording of work on placer leases as required under the *Mining (Placer) Act*, must be made at the office of the Gold Commissioner for the mining division in which the claim or lease is located. The statistics for the Gold Commissioner's office are shown in Table 2-11.

CENTRAL RECORDS OFFICE (VICTORIA AND VANCOUVER)

Copies of records of mineral claims recorded in the office of the Gold Commissioners are forwarded to the office of the Chief Gold Commissioner daily, while transcripts of all other recording in the offices of the Gold Commissioners are sent twice monthly.

Information concerning claims and leases and the ownership and standing of claims and leases in any mining division may be obtained from the Gold Commissioner for the mining division in which the property is situated or from the Ministry's offices, Room 412, Douglas Building, 617 Government Street, Victoria, and 800 Hornby Street, Vancouver, the office of the Gold Commissioner.

The records and maps, showing the approximate positions of mineral claims held by record and of placer leases, may be viewed by the public during regular office hours in Victoria and at the office of the Gold Commissioner in Vancouver. The position of the mineral claims held by record and of placer leases is plotted from details supplied by the locators. Prints of mineral and placer titles reference maps at a scale of 1:50 000 may be obtained from the Victoria and Vancouver offices.

Appointed officials in the office of the Gold Commissioner at Victoria and the Gold Commissioner at Vancouver act as Sub-recorders for all mining divisions.

MINERAL AND PLACER TITLE MAPS

The initial program of redrawing mineral titles reference maps which are produced for the public on a scale of 1:50 000 was completed in 1977 and the entire province is now available at this scale.

One thousand four hundred forty-one applications were received for placer leases under a new system, established in 1975 with the proclamation of a new *Mining (Placer) Act*, of only accepting applications for lease in designated areas.

Table 2.11. Gold Commissioner's Office Statistics

MINING DIVISION	FREE MINER CERTIFICATE		LODE MINING						PLACER MINING					REVENUE		
	Ind.	Co.	Mineral Claim Units	Work Nos.	Cash In Lieu $	Bills of Sale	Mining Leases	Lease Rentals $	Leases Issued	Work Nos.	Cash In Lieu $	Bills of Sale	Extn.	Free Miner Certificate $	Mining Receipts $	Total $
Alberni	67	1	1 008	4 567	30 800	41	—	2 148	—	—	—	2	—	1 375	61 648	63 023
Atlin	175	3	2 120	6 677	25 960	14	—	368	97	530	4 500	64	2	4 775	120 717	125 492
Cariboo	1 719	24	2 821	17 816	23 430	77	—	10 496	709	2 102	33 900	318	19	34 415	376 920	411 336
Clinton	56	3	1 551	6 363	11 000	23	—	—	21	204	900	5	—	2 000	79 466	81 466
Fort Steele	362	8	1 091	8 467	17 050	20	—	2 664	33	164	600	15	1	8 550	98 371	106 921
Golden	135	1	483	5 998	18 040	25	—	1 028	4	6	—	—	—	2 415	55 878	58 293
Greenwood	123	3	1 503	3 068	15 290	47	—	4 440	29	50	300	5	—	3 335	59 188	62 523
Kamloops	485	22	2 964	17 642	92 620	89	1	23 232	6	26	900	5	1	15 145	264 137	279 282
Liard	315	1	5 182	38 430	121 880	53	—	6 004	71	367	3 900	26	—	6 510	692 792	699 302
Lillooet	118	2	1 714	5 303	31 900	34	—	794	25	41	2 100	9	—	1 930	74 097	76 027
Nanaimo	332	9	1 502	3 685	18 260	46	—	8 274	2	4	—	—	—	8 820	66 890	75 710
Nelson	341	4	655	3 625	25 630	39	—	952	27	31	300	4	—	6 965	38 714	45 679
New Westminster	849	25	1 911	5 569	13 640	117	—	1 920	22	104	1 500	7	6	21 605	76 750	98 355
Nicola	58	1	758	4 760	12 430	28	—	2 736	—	—	—	—	—	1 130	46 923	48 053
Omineca	421	6	2 904	43 962	76 670	113	—	22 182	115	379	3 600	38	3	8 710	361 007	369 717
Osoyoos	198	7	502	3 747	48 180	22	—	8 028	—	—	—	—	—	5 530	88 559	94 089
Revelstoke	100	4	1 328	7 056	27 280	33	—	750	19	83	300	1	—	4 040	87 158	91 198
Similkameen	287	1	694	4 408	15 070	55	—	4 476	93	257	300	34	5	3 530	75 456	78 986
Skeena	185	3	2 142	23 572	77 990	55	—	3 922	12	21	—	3	1	4 125	218 632	222 757
Slocan	180	8	5 748	5 874	36 190	104	—	5 603	—	4	—	—	—	5 900	101 857	107 757
Trail Creek	40	1	82	262	1 870	5	—	748	—	—	—	—	—	1 000	7 271	8 271
Vancouver	2 394	587	1 975	4 216	21 780	41	—	412	—	—	—	—	—	275 110	133 914	409 024
Vernon	427	8	891	2 978	15 070	13	—	654	15	64	300	6	1	10 395	45 498	55 893
Victoria	683	78	776	2 272	12 320	13	—	80	22	44	300	5	—	43 760	147 407	191 167
TOTALS 1982	10 050	810	42 305	230 317	790 350	1 107	1	111 911	1 322	4 481	53 700	547	39	481 070	3 379 250	3 860 320
TOTALS 1981	16 260	1 161	71 667	248 030	1 111 880	1 595	1	91 055	1 946	3 713	80 700	695	91	432 160	3 746 009	4 178 169

There were 17 requests for the designation of additional areas under the *Mining (Placer) Act*.

Mineral Claims Inspectors are based at Kamloops, Smithers, Vancouver, and Nelson. Their duties include checking the locations of mineral claims to correlate them with the plotted position of the claims, determining the validity of the staking under the *Mineral Act* and the *Mining (Placer) Act* and Regulations, investigations of possible misuse of mineral claims, and investigations of disputes. In order to fulfill the objectives of providing claim-holders with firm titles and maintaining accurate and up-to-date records, the activities of the inspectors have increased with the use of the modified grid system and also as a result of the continued high volume of applications for placer leases.

During 1982 as a result of 30 complaints under section 50 of the *Mineral Act*, 27 mineral claims were cancelled.

COAL

The Coal Administrator is responsible to the Chief Gold Commissioner for the daily administration of the *Coal Act*. This involves reviewing applications for coal licences and leases and maintenance of records of title.

The statistics related to coal licences for 1982 as shown in Table 2-12.

Table 2.12.

STATISTICS FOR COAL LICENCES, 1982

Number of coal licence applications	180
Approximate areas of coal licence applications ...	47 272 hectares
Number of coal licences issued	224
Approximate areas of coal licences issued	60 559 hectares
Annual rental	$2 954 387.00
Application fees	$ 3 685.00
Cash in lieu of work	$43 447.50
Miscellaneous fees	$13 120.00
Total...............	$2 975 539.50

MINERAL RESOURCES STATISTICS

CHAPTER 3

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INTRODUCTION

The statistics of the mineral industry are collected, compiled, and tabulated for this report by the Mineral Economics Branch of the Mineral Resources Division.

In the interests of uniformity and to avoid duplication of effort, beginning with the statistics for 1925, Statistics Canada and the provincial ministries have cooperated in collecting and processing mineral statistics.

Producers of metals, industrial minerals, structural materials, coal, and petroleum and natural gas are requested to submit returns in duplicate on forms prepared for use by the province and by Statistics Canada.

As far as possible, both organizations follow the same practice in processing the data. The final compilation by Statistics Canada is usually published considerably later than the Annual Report of the Ministry of Energy, Mines and Petroleum Resources for British Columbia. Differences between the values of production published by the two organizations arise mainly because Statistics Canada uses average prices considered applicable to the total Canadian production, whereas the British Columbia mining statistician uses prices considered applicable to British Columbia production.

Peat, classified as a fuel by Statistics Canada, is not included in the British Columbia statistics of mineral production, being regarded as neither a fuel nor a mineral.

The statistics of the petroleum industry are collected, compiled, and tabulated for this report by the Petroleum Resources Branch. They are included here for comparative purposes.

METHODS OF COMPUTING PRODUCTION

The tabulated statistics are arranged so as to facilitate comparison of the production records for the various mining divisions, and from year to year. From time to time, revisions have been made to figures published in earlier reports as additional data became available or errors became known.

Data are obtained from the certified returns made by the producers of metals, industrial minerals and structural materials, and coal, and are augmented by data obtained from custom smelters. For petroleum, natural gas, and liquid by-products, production figures supplied by the Petroleum Resources Branch of the Ministry of Energy, Mines and Petroleum Resources are compiled from the monthly disposition reports and the Crown royalty statement filed with the Ministry by the producers.

Values are in Canadian funds. Metric weights are used throughout.

METALS

AVERAGE PRICES

The prices used in the valuation of current and past production of gold, silver, copper, lead, and zinc are shown in the table on page 91.

Prior to 1974 the price of gold used was the average Canadian Mint buying-price for fine gold.

The price used for placer gold originally was established arbitrarily at $17 per ounce, when the price of fine gold was $20.67 per ounce. Between 1931 and 1962 the price was proportionately increased with the continuously changing price of fine gold. Since 1962, Canadian Mint reports giving the fine-gold content have been available for all but a very small part of the placer gold produced, and until 1973 the average price listed is derived by dividing ounces of placer gold into total amount received. Starting in 1974 the price used for the valuation of gold, lode and placer, is the amount received by the producer.

Prior to 1949 the prices used for silver, copper, lead and zinc were the average prices at the markets indicated in the table on page 91, converted into Canadian funds. The abbreviations in the table are Mont. = Montreal; N.Y. = New York; Lon. = London; E. St. L. = East St. Louis; and U.S. = United States.

Starting in 1949 the price of silver, copper, lead, and zinc were average United States prices converted into Canadian funds. Average monthly prices were supplied by Statistics Canada from figures published in the Metal Markets section of Metals Week. Specifically, for silver it was the New York price; for lead it was the New York price; for zinc it was the price at East St. Louis of Prime Western; for copper it was the United States export refinery price. Commencing in 1970 the copper price is the average of prices received by the various British Columbia shippers and since 1974 this applies also to gold, silver, lead, zinc, and cadmium.

For antimony and bismuth the average producers' price to consumers is used. For nickel the price used is the Canadian price set by Inco Limited. The value per tonne of the iron ore used in making pig iron at Kimberley was an arbitrary figure, being the average of several ores of comparable grade at their points of export from British Columbia.

GROSS AND NET CONTENT

The gross content of a metal in ore, concentrate, or bullion is the amount of the metal calculated from an assay of the material, and the gross metal contents are the sum of individual metal assay contents. The net contents are the gross contents less smelter and refinery losses.

In past years there have been different methods used in calculating net contents, particularly in the case of one metal contained in the concentrate of another. The method established in 1963 is outlined in the following table. For example, the net content of silver in copper concentrates is 98 per cent of the gross content, of cadmium in zinc concentrates is 70 per cent of the gross content, etc. Commencing in 1974 the quantities represent the actual net quantities of metals paid for.

	LEAD CONCENTRATES Per Cent	ZINC CONCENTRATES Per Cent	COPPER CONCENTRATES Per Cent	COPPER-NICKEL CONCENTRATES Per Cent	COPPER MATTE Per Cent
Silver	98	98	98	--	--
Copper	Less 26 lb./ton	--	Less 10 lb./ton	85	Less 10 lb./ton
Lead	98	50	--	--	50
Zinc	50	90	--	--	--
Cadmium	--	70	--	--	--
Nickel	--	--	--	88	--

VALUE OF PRODUCTION

For indium, iron concentrate, mercury, molybdenum, rhenium, and tin the value of production is the amount received by the shippers.

For gold, silver, copper, lead, zinc, antimony, bismuth, cadmium, some iron concentrate, and nickel the value of production was calculated from the assay content of the ore, concentrate, or bullion less appropriate smelter losses, and an average price per unit of weight. Since 1974 the values represent the settlement values received by the producers for the respective metals.

Prior to 1925 the value of gold and copper produced was calculated by using their true average prices and, in addition, for copper the smelter loss was taken into account.

The value of other metals was calculated from the gross metal content of ores or concentrates by using a metal price which was an arbitrary percentage of the average price, as follows: silver, 95 per cent; lead, 90 per cent; and zinc, 85 per cent.

It is these percentages of the average price that are listed in the table on page 91.

For 1925 to 1973 the values had been calculated by using the true average price (*see* page 91) and the net metal contents in accordance with the procedures adopted by Statistics Canada and the Ministry of Energy, Mines and Petroleum Resources.

Since 1974 the total quantity and value of metal production include the quantities paid for to the mines, and the smelter and refinery production that can be attributed to the mines but is not paid for. The quantity and value paid for to the mines, excluding outward transportation costs, smelting and refining costs, penalties and deductions, are shown separately for comparative purposes.

INDUSTRIAL MINERALS AND STRUCTURAL MATERIALS

The values of production of industrial minerals and structural materials are approximately the amounts received at the point of origin.

COAL

The value of production of coal is calculated using a price per tonne which is the weighted average of the f.o.b. prices at the mine for the coal sold.

PETROLEUM AND NATURAL GAS

The values of production of natural gas, natural gas liquid by-products, and petroleum including condensate/pentanes plus are the amounts received for the products at the well head.

NOTES ON PRODUCTS LISTED IN THE TABLES

Antimony--Antimony metal was produced at the Trail smelter from 1939 to 1944; since 1944 it has been marketed alloyed with lead. The antimony is a by-product of silver-lead ores. In 1907 the first recorded antimonial ore mined in British Columbia was shipped from the Slocan area to England. Since then other out-of-province shipments have originated in the Bridge River, North Lardeau, Slocan, Spillimacheen, and Stuart Lake areas. In Table 3-7C the antimony assigned to individual mining divisions is the reported content of ore exported to foreign smelters; the antimony "not assigned" is that recovered at the Trail smelter from various ores received there. *See* Tables 3-1, 3-3, and 3-7C.

Arsenious Oxide--Arsenious oxide was recovered at foreign smelters from arsenical gold ores from Hedley between 1917 and 1931, and in 1942, and from the Victoria property on Rocher Deboule Mountain in 1928. No production has been recorded since 1942. *See* Tables 3-1 and 3-7D.

Asbestos--British Columbia has produced asbestos since 1952 when the Cassiar mine was opened. All British Columbia production consists of chrysotile from the Cassiar mine near the Yukon boundary. This deposit is noted for its high percentage of valuable long fibre and for the low iron content of the fibre. The original claims were located at Cassiar in 1950, and the first fibre was shipped two years later. The fibre is milled from the ore at Cassiar and now most is shipped by truck to Stewart. From 1953 to 1961 the fibre was valued at the shipping point in North Vancouver, but beginning in 1962 it has been valued at the mine, and values for the preceding years have been recalculated on that basis. *See* Tables 3-1, 3-3, and 3-7D.

Barite--Barite production began in 1940 and has been continuous since then, coming from several operations in the upper Columbia River valley. Some barite has been mined from lode deposits and the rest recovered from the mill-tailings ponds of the former Silver Giant and Mineral King silver-lead-zinc mines. *See* Table 3-7D.

Bentonite--Small amounts of bentonite were produced between 1926 and 1944 from deposits in the coal measures near Princeton. There has been no production since 1944. *See* Tables 3-1 and 3-7D.

Bismuth--Since 1929 the Trail smelter has produced bismuth. It is a by-product of lead refining and thus the production cannot be assigned to specific properties or mining divisions. *See* Tables 3-1, 3-3, and 3-7C.

Brick--*See* Clay and Shale Products.

Building-stone--Dimensional stone for building purposes is quarried when required from a granite deposit on Nelson Island and an andesite deposit on Haddington Island. Other stone close to local markets is quarried periodically or as needed for special building projects. *See* Tables 3-1, 3-3, and 3-7E.

Butane--Butane is recovered as a by-product at the gas-processing plant at Taylor and at oil refineries. *See* Tables 3-1, 3-3, and 3-7A.

Cadmium--Cadmium has been recovered as a by-product at the Trail zinc refinery since 1928. It occurs in variable amounts in the sphalerite of most British Columbia silver-lead-zinc ores. In Table 3-7C the cadmium assigned to individual mining divisions is the reported content of custom shipments to the Trail and foreign smelters; that "not assigned" is the remainder of the reported estimated recovery at the Trail smelter from British Columbia concentrates. *See* Tables 3-1, 3-3, and 3-7C.

Cement--Cement is manufactured from carefully proportioned mixtures of limestone, gypsum, and other mineral materials. It has been produced in British Columbia since 1905. Present producers are Inland Cement Industries Ltd., with a 907 180-tonnes-per-year plant on Tilbury Island, and Canada Cement Lafarge Ltd., with a 476 000-tonnes-per-year plant on Lulu Island and a 191 000-tonnes-per-year plant at Kamloops. *See* Tables 3-1, 3-3, and 3-7E.

Chromite--Two shipments of chromite are on record, 608 tonnes from Cascade in 1918 and 114 tonnes from Scottie Creek in 1929. *See* Tables 3-1 and 3-7C.

Clay and Shale Products--These include brick, blocks, tile, pipe, pottery, lightweight aggregate, and pozzolan manufactured from British Columbia clays and shales. Common red-burning clays and shales are widespread in the province, but better grade clays are rare. The first recorded production was of bricks at Craigflower in 1853 and since then plants have operated in most towns and cities for short periods. Local surface clay is used at Haney to make common red brick, tile, and flower pots. Shale and fireclay from Abbotsford Mountain are used to make firebrick, facebrick, sewer pipe, flue lining, and special fireclay shapes in plants at Kilgard, Abbotsford, and South Vancouver. A plant at Quesnel makes pozzolan from burnt shale quarried south of Quesnel. Several hobby and art potteries and a sanitary-ware plant are in operation, but these use mainly imported raw materials and their production is not included in the tables. *See* Tables 3-1, 3-3, and 3-7E.

Coal--Coal is almost as closely associated with British Columbia's early history as is placer gold. Coal was discovered at Suquash on Vancouver Island in 1835 and at Nanaimo in 1850. The yearly value of coal production passed that of placer gold in 1883 and contributed a major part of the total mineral wealth for the next 30 years.

First production, by mining divisions: Cariboo, 1942; Fort Steele, 1898; Kamloops, 1893; Liard, 1923; Nanaimo, 1836; Nicola, 1907; Omineca, 1918; Osoyoos, 1926; Similkameen, 1909; and Skeena, 1912.

The Nanaimo and Comox fields produced virtually all of the coal until production started from the Crowsnest field in 1898. The Crowsnest field contains coking coal and prospered in the early years of smelting and railroad building. Mining started in the Nicola-Princeton Coalfield in 1907, at Telkwa in 1918, and on the Peace River in 1923. The Nanaimo field was exhausted in 1953 when the last large mines closed, and only small operations on remnants were left. The colliery at Merritt closed in 1945 and at Coalmont in 1940. The closing of the large mine at Tsable River in 1966, and the last small one, near Wellington in 1968, marked the end of continuous production from the important Vancouver Island deposits. Recent exploration indicates the possibility of renewed coal mining on the island.

Undeveloped fields include basins in the foothills of the Rocky Mountains south of the Peace River, the Groundhog basin in north-central British Columbia, the Hat Creek basin west of Ashcroft, and Sage Creek basin southeast of Fernie.

The enormous requirements for coking coal in Japan created intense exploration in various areas of British Columbia since 1968. The signing of large contracts with the Japanese resulted in preparations for production at several deposits in the East Kootenays. First shipments to Japan via special port facilities at North Vancouver and Roberts Bank began in 1970.

All the coal produced, including that used in making coke, is shown as primary mine production. Quantity from 1836 to 1909 is gross mine output and includes material lost in picking and washing. From 1910 the quantity is the amount sold and used, which includes sales to retail and wholesale dealers, industrial users, and company employees; coal used under company boilers, including steam locomotives; and coal used in making coke. *See* Tables 3-1, 3-3, 3-7A, 3-8A, and 3-8B.

Cobalt--In 1928 a recovery of 1,730 pounds of cobalt was made from a shipment of arsenical gold ore from the Victoria mine on Rocher Deboule Mountain. From 1971 to 1973, cobalt was shipped from the Pride of Emory mine at Hope. *See* Tables 3-1 and 3-7C.

Coke--Coke is made from special types of coal. It has been produced in British Columbia since 1895. Being a manufactured product, its value does not contribute to the total mineral production as shown in Table 3-1. Up to 1966, coke statistics had been included in the Annual Report at Table 3-9, but this table has been discontinued. The coal used in making coke is still recorded in Table 3-8B.

Condensate--(a) *Field*--Field condensate is the liquid hydrocarbons separated and recovered from natural gas in the field before gas processing. (b) *Plant*--Plant condensate is the hydrocarbon liquid extracted from natural gas at gas-processing plants. *See* Tables 3-1, 3-3, and 3-7A.

Copper--From 1935 to 1978 no copper smelter operated in British Columbia and most of the copper concentrates were shipped to Japanese, eastern Canadian, and American smelters. In 1978, Afton Mines Ltd. started producing blister copper from its own concentrates. Most of the smelting in British Columbia in early years was done on ore shipped directly from the mines without concentration, but modern practice is to concentrate the ore first. Small amounts of gold and silver are commonly present and add value to the ore.

Ore was smelted in British Columbia first in 1896 at Nelson (from Silver King mine) and at Trail (from Rossland mines), and four and five years later at Grand Forks (from Phoenix mine) and Greenwood (from Mother Lode mine). Later, small smelters were built in the Boundary district and on Vancouver and Texada Islands, and in 1914 the Anyox smelter was blown in. Copper smelting ceased in the Boundary district in 1919, at Trail in 1929, and at Anyox in 1935. British Columbia copper concentrates were then smelted mainly at Tacoma, and since 1961 have gone chiefly to Japan.

Most of the production has come from southern British Columbia--from Britannia, Copper Mountain, Greenwood, Highland Valley, Merritt, Nelson, Rossland, Texada Island, and Vancouver Island, although a sizable amount came from Anyox and some from Tulsequah. During the 1960's, exploration for copper became intense, interest being especially directed toward finding very large, low-grade deposits suitable for open-pit mining. The activity has resulted in the establishment of operating mines at Merritt (Craigmont) in 1961, in Highland Valley (Bethlehem) in 1962, on Babine Lake (Granisle) in 1966, near Peachland (Brenda) in 1970, Stewart (Granduc)--closed mid-1978 but reopened in late 1980, near Port Hardy (Island Copper) in 1971, near Babine Lake (Bell), McLeese Lake (Gibraltar), Highland Valley (Lornex), Princeton (Ingerbelle) in 1972, and near Kamloops (Afton) in 1977. *See* Table 3-12 for a complete list of copper producers. The Highmont mine in the Highland Valley commenced shipments in 1981.

Some of these mines produce molybdenum as a by-product, for example, Bethlehem, Brenda, Highmont, Lornex, Gibraltar, and Island Copper. Copper is also produced as a by-product of iron mining at Tasu Sound, Queen Charlotte Islands (Wesfrob), and with ores containing zinc, gold, silver, lead, and cadmium, at Buttle Lake (Lynx and Myra, Western Mines).

Copper has been the most valuable single commodity of the industry since 1966 except in 1977, 1979, 1981 and 1982 when it was surpassed by natural gas and coal. *See* Tables 3-1, 3-3, 3-6, and 3-7B.

Crude Oil--Production of crude oil in British Columbia began in 1955 from the Fort St. John field, but was not significant until late in 1961, when the oil pipeline was built to connect the oil-gathering terminal at Taylor to the Trans Mountain Oil Pipe Line Company pipeline near Kamloops.

In Tables 3-1, 3-3, and 3-7A, quantities given prior to 1962 under "petroleum, crude" are total sales, but since 1962 the field and plant condensates are listed separately. Table 3-14 incorporates all revisions since the commencement of production.

Diatomite--Relatively large deposits of diatomite are found near the Fraser River in the Quesnel area, and small deposits are widespread throughout the province. Small amounts of diatomite have been shipped from Quesnel periodically since 1928. A plant to process the material is located in Quesnel. *See* Table 3-7D.

Fluorite (Fluorspar)--Between 1918 and 1929, fluorite was mined at the Rock Candy mine north of Grand Forks for use in the Trail lead refinery. From 1958 to 1968, small quantities were produced as a by-product at the Oliver silica quarry. *See* Table 3-7D.

Flux--Silica and limestone are added to smelter furnaces as flux to combine with impurities in the ore and form a slag which separates from the valuable metal. In the past, silica was shipped from Grand Forks, Oliver, and the Sheep Creek area. Today, silica from near Kamloops and limestone, chiefly from Texada Island, are produced for flux. Quantities have been recorded since 1911. *See* Tables 3-1, 3-3, and 3-7D.

Gold, Lode--Gold has played an important part in mining in the province. The first discovery of lode gold was on Morseby Island in 1852, when some gold was recovered from a small quartz vein. The first stamp mill was built in the Cariboo in 1876, and it seems certain that some arrastras (primitive grinding mills) were built even earlier. These and other early attempts were short-lived, and the successful milling of gold ores began about 1890 in the southern part of the province. By 1900 the value of gold production was second only to that of coal. At the start of World War II, gold mining attained a peak yearly value of more than $22 million, but since the war it has dwindled until developments in the 1970's.

In the early years, lode gold came mostly from the camps of Rossland, Nelson, McKinney, Fairview, Hedley, and also from the copper and other ores of the Boundary district. A somewhat later major producer was the Premier mine at Stewart. In the 1930's the price of gold increased and the value of production soared, new discoveries were made and old mines were revived. The principal gold camps, in order of output of gold, have been Bridge River, Rossland, Portland Canal, Hedley, Wells, and Sheep Creek. In 1971 the Bralorne mine at Bridge River closed.

With the closing of the Bralorne mine, most of the lode gold is produced as a by-product of copper, copper-zinc-silver, and other base metal mining. Because of the volume of this production the amount of gold produced is still at a fairly high level, and with the significant rise in the price of gold in the 1970's the value of production has exceeded the peaks reached during the era of gold mines in the 1930's. With the new high prices for gold, interest has reawakened in vein and bulk gold properties with new producing mines like Carolin, Baker, Erickson and Morris Summit (Scottie Gold). *See* Tables 3-1, 3-3, 3-6, and 3-7B. *See* Table 3-12 for a complete list of current producers.

Gold, Placer--The early explorations and settlement of the province followed rapidly on the discovery of gold-bearing placer creeks throughout the country. The first placer-miners came in 1858 to mine the lower Fraser River bars upstream from Yale.

The year of greatest placer-gold production was 1863, shortly after the discovery of the placer in the Cariboo. Another peak year in 1875 marked the discovery of placer on creeks in the Cassiar. A minor peak year was occasioned by the discovery of placer gold in the Granite Creek in the Tulameen in 1885. A high level of production ensued after 1899, when the Atlin placers reached their peak output. Other important placer-gold camps were established at Goldstream, Fort Steele, Rock Creek, Omineca River, and Quesnel River. The last important strike was made on Cedar Creek in 1921, and coarse gold was found on Squaw Creek in 1927 and on Wheaton Creek in 1932.

Mining in the old placer camps revived during the 1930's under the stimulus of an increase in the price of fine gold from $20.67 per ounce to $35 per ounce in United States funds. Since World War II, placer mining declined under conditions of steadily rising costs and a fixed price for gold but is showing signs of revival in response to a freely floating gold price since 1972. Since 1858, more than 163 966 618 grams valued $111.9 million has been recovered.

A substantial part of the production, including much of the gold recovered from the Fraser River upstream from Yale (in the present New Westminster, Kamloops, and Lillooet Mining Divisions) and much of the early Cariboo production, was mined before the original organization of the Department of Mines in 1874. Consequently, the amounts recorded are based on early estimates and cannot be accurately assigned to individual mining divisions.

The first year of production for major placer-producing mining divisions was: Atlin, 1898; Cariboo, 1859; Liard, 1873; Lillooet, 1858; Omineca, 1869.

In 1965, changes were made in the allocation of placer gold in New Westminster and Similkameen Mining Divisions and "not assigned," to reconcile those figures with data incorporated in Bulletin 28, *Placer Gold Production of British Columbia*. *See* Tables 3-1, 3-3, 3-6, and 3-7A.

Granules--Rock chips used for bird grits, exposed aggregate, roofing, stucco, dash, terrazzo, etc., have been produced in constantly increasing quantities since 1930. Plants operate in Burnaby and near Grand Forks, Sirdar, Vananda, and Armstrong. *See* Tables 3-1, 3-3, and 3-7D.

Gypsum and Gypsite--Production of gypsum and gypsite has been recorded since 1911. Between 1925 and 1956, more than 907 000 tonnes were shipped from Falkland and some was quarried near Cranbrook and Windermere. Since 1956, nearly all production has come from Windermere. *See* Tables 3-1, 3-3, and 3-7D.

Hydromagnesite--Small shipments of hydromagnesite were made from Atlin between 1904 and 1916 and from Clinton in 1921. *See* Tables 3-1 and 3-7D.

Indium--Production of indium as a by-product of zinc refining at the Trail smelter began in 1942. Production figures have not been disclosed since 1958.

Iron--Iron ore was produced in small quantities as early as 1885, commonly under special circumstances or as test shipment. Steady production started in 1951 with shipments of magnetite concentrates to Japan from Vancouver and Texada Islands. Most of the known iron-ore deposits are magnetite, and occur in the coastal area. On the average they are low in grade and need to be concentrated. Producing mines have operated on Texada Island, at Benson Lake and Zeballos on Vancouver Island, and at Tasu and Jedway on Morseby Island. At Texada Island copper was a by-product of iron mining, and in the Coast Copper mine at Benson Lake iron was a by-product of copper mining. The latest operation, and to date the largest, is that of Wesfrob Mines Limited at Tasu, begun at the end of 1967; copper is produced as a by-product.

From January 1961 to August 1972, calcined iron sulphide from the tailings of the Sullivan mine was used for making pig iron at Kimberley. This was the first manufacture of pig iron in British Columbia. The iron occurs as pyrrhotite and pyrite in the lead-zinc ore of the Sullivan mine. In the process of milling, the lead and zinc minerals are separated for shipment to the Trail smelter, and the iron sulphides are separated from the waste rock. Over the years a stockpile has been built containing a reserve of about 18 million tonnes of iron ore. The sulphur was removed in making pig iron and was converted to sulphuric acid, which was used in making fertilizer. A plant built at Kimberley converted the pig iron to steel, and a fabricating plant was acquired in Vancouver. The iron smelter at Kimberley closed in August 1972. The entire production, credited to the Fort Steele Mining Division in Table 3-7C, is of calcine. *See* Tables 3-1, 3-3, 3-6, and 3-7C.

Iron Oxide--Iron oxide, ochre, and bog iron were mined as early as 1918 from several occurrences, but mainly from limonite deposits north of Squamish. None has been produced since 1950. *See* Tables 3-1 and 3-7D.

Jade (Nephrite)--Production of jade (nephrite) has been recorded only since 1959 despite there being several years of significant production prior to that date. The jade is recovered from bedrock occurrences on Mount Ogden and near Dease Lake and as alluvial boulders from the Fraser River; the Bridge River and its tributaries, Marshall, Hell, and Cadwallader Creeks; O'Ne-ell, Ogden, Kwanika, and Wheaton Creeks. *See* Tables 3-1, 3-3, and 3-7D.

Lead--Lead was the most valuable single commodity for many years, but it was surpassed in value of annual production by zinc in 1950, by copper in 1966, by molybdenum in 1969, and in total production by zinc in 1966.

Lead and zinc usually occur together in nature although not necessarily in equal amounts in a single deposit. Zinc is the more abundant metal, but lead ore usually is more valuable than zinc ore because it contains more silver as a by-product. For a long time British Columbia produced almost all of Canada's lead, but now produces about 29 per cent of the total. Most of the concentrated ore was smelted and the metal refined at Trail in 1982.

Almost all of British Columbia's lead comes from the southeastern part of the province. The Sullivan mine at Kimberley is now producing about 82.7 per cent of the province's lead and has produced about 85.9 per cent of the grand total. This is one of the largest mines in the world and supports the great metallurgical works at Trail. Other mines are at Pend-d'Oreille River, North Kootenay Lake, Slocan, southwestern British Columbia, and Vancouver Island. In northwestern British Columbia less important parts of the total output have come from Tulsequah, the Premier mine, and several small mines in the general region of Hazelton. *See* Table 3-12 for the current lead producers.

A small amount of high-grade lead ore is shipped directly to the smelter, but most of the ore is concentrated by flotation and the zinc content is separated from the lead. Generally all output from the Sullivan goes to the Trail smelter. Lead was first produced in 1887, and the total production amounts to approximately 8.2 million tonnes.

In 1958, revisions were made in some yearly totals for lead to adjust them for recovery of lead from slag treated at the Trail smelter. *See* Tables 3-1, 3-3, 3-6, and 3-7B.

Limestone--Besides being used for flux and granules (where it is recorded separately), limestone is used in agriculture, in cement manufacture, in the pulp and paper industry, and for making lime. It has been produced since 1886. Quarries now operate near Prince George, at Kamloops, and on the north end of Texada Island. *See* Tables 3-1, 3-3, and 3-7E.

Magnesium--In 1941 and 1942, Cominco Ltd. produced magnesium from magnesite mined from a large deposit at Marysville. *See* Tables 3-1 and 3-7C.

Magnesium Sulphate--Magnesium sulphate was recovered in minor amounts at various times between 1915 and 1942 from small alkali lakes near Basque, Clinton, and Osoyoos. *See* Tables 3-1 and 3-7D.

Manganese--From 1918 to 1920, manganese ore was shipped from a bog deposit near Kaslo and from Hill 60 near Cowichan Lake, and in 1956 a test shipment was made from Olalla. *See* Tables 3-1 and 3-7C.

Mercury--Mercury was first produced near Savona in 1895. Since then small amounts have been recovered from the same area and from the Bridge River district. The main production to date was between 1940 and 1944 from the Pinchi Lake and Takla mines near Fort St. James. In 1968 the Pinchi Lake mine reopened and continued in operation until 1975 when it closed because of market situations. *See* Tables 3-1 and 3-7C.

Mica--No sheet mica has been produced commercially in British Columbia. Between 1932 and 1961, small amounts of mica schist for grinding were mined near Albreda, Armstrong, Oliver, Prince Rupert, and Sicamous. *See* Tables 3-1 and 3-7D.

Molybdenum--Molybdenum ore in small amounts was produced from high-grade deposits between 1914 and 1918. Recently, mining of large low-grade molybdenum and copper-molybdenum deposits has increased production to the point that molybdenum now ranks second in importance in annual value of metals produced in British Columbia. The upswing began when the Bethlehem mine recovered by-product molybdenum from 1964 to 1966, commencing again in 1978. In 1965 the Endako and Boss Mountain mines, followed by the Coxey in 1966, and British Columbia Molybdenum mine in 1967, all began operations as straight molybdenum producers. The British Columbia Molybdenum mine closed in 1972 and re-commenced shipping in 1982 as the Kitsault mine. The Boss Mountain mine closed in 1971 and reopened late in 1973. The Coxey and British Columbia Molybdenum mines closed in 1971 and 1972 respectively. In 1970 the Brenda mine, a combined copper-molybdenum producer, started operating, and Island Copper in 1971, and Lornex in 1972, while Gibraltar ceased molybdenum production in 1975 but recommenced in 1977. In 1981 the Highmont mine began shipping molybdenum. *See* Tables 3-1, 3-3, 3-6, and 3-7C.

Natro-alunite--In 1912 and 1913, 363 tonnes of natro-alunite was mined from a small low-grade deposit at Kyuquot Sound. There has been no subsequent production. *See* Tables 3-1 and 3-7D.

Natural gas--Commercial production of natural gas began in 1954 to supply the community of Fort St. John. In 1957 the gas plant at Taylor and the pipeline to serve British Columbia and the northwestern United States was completed.

The production shown in Tables 3-1, 3-3, 3-7A, and 3-14, is the total amount sold of residential gas from processing plants plus dry and associated gas from the gas-gathering system; that is, the quantity delivered to the main transmission-line. The quantity is net after deducting gas used on leases, metering difference, and gas used or lost in the cleaning plant. The quantity is reported as millions of cubic metres at standard condition [99.2 kPa (kilopascals) pressure, 15°C temperature, up to and including the year 1960, and thereafter 101.3 kPa pressure, 15°C temperature]. Full details of gross well output, other production, delivery, and sales are given in the tables in the *Summary of Operations, Petroleum Resources Division.*

Nickel--One mine, the Pride of Emory near Hope, shipped nickel ore in 1936 and 1937 and began continuous production in 1958. From 1960 to 1974, bulk copper and nickel concentrates have been shipped to Japan and Alberta respectively for smelting. The mine closed in August 1974. *See* Tables 3-1, 3-3, and 3-7C.

Niobium--Niobium was produced from placer deposits on Vowell and Malloy Creeks in the Bugaboo area in 1956. A test shipment of 8 187 tonnes of gravel was shipped by St. Eugene Mining Corporation Limited to Quebec Metallurgical Industries. The placer contained a variety of minerals, including pyrochlore and uraninite. Recovery from the test shipment was as follows: 104.39 kilograms of niobium and 146.29 kilograms of uranium and thorium.

Palladium--Palladium was recovered in 1928, 1929, and 1930 as a by-product of the Trail refinery and is presumed to have originated in copper concentrates shipped to the smelter from the Copper Mountain mine. *See* Tables 3-1 and 3-7C.

Perlite--In 1953 a test shipment of 1 009 tonnes was made from a quarry on Francois Lake. There has been no further production. *See* Tables 3-1 and 3-7D.

Petroleum, Crude--See Crude oil.

Phosphate Rock--Between 1927 and 1933, Cominco Ltd. produced 3 485 tonnes of phosphate rock for test purposes, but the grade proved to be too low for commercial use. More test shipments were made in 1964, but there has been no commercial production. *See* Tables 3-1 and 3-7D.

Platinum--Platinum has been produced intermittently from placer streams in small amounts since 1887, mostly from the Tulameen and Similkameen Rivers. Placer platinum also has been recovered from Pine, Thibert, McConnell, Rainbow, Tranquille, Rock, and Government Creeks; from Quesnel, Fraser, Cottonwood, Peace, and Coquihalla Rivers; and from beach placers on Graham Island. Some platinum recovered between 1928 and 1930 as a by-product at the Trail refinery is presumed to have originated in copper concentrates shipped to the smelter from the Copper Mountain mine. Small amounts were contained in the placer gold in 1979. *See* Tables 3-1, 3-3, and 3-7C.

Propane--Propane is recovered from gas-processing plants at Taylor and Boundary Lake, and at oil refineries. *See* Tables 3-1, 3-3, and 3-7A.

Rhenium--Rhenium occurs in significant quantities only with molybdenite associated with porphyry copper deposits. It was first produced in 1972 by the Island Copper mine and is extracted as rhenium oxide from fumes produced during roasting of the molybdenite concentrate.

Rock--Production of rubble, riprap, and crushed rock has been recorded since 1909. *See* Tables 3-1, 3-3, and 3-7E.

Sand and gravel--Sand and gravel is used as aggregate in concrete work. The output varies from year to year according to the level of activity in the construction industry. *See* Tables 3-1, 3-3, and 3-7E.

Selenium--The only recorded production of selenium, 332 kilograms, was in 1931 from the refining of blister copper from the Anyox smelter. *See* Tables 3-1 and 3-7C.

Silver--Silver is recovered from silver ores or as a by-product of other ores. Most of it is refined in Trail, and some is exported in concentrated ores of copper, lead, and zinc to American and Japanese smelters. Silver bullion was produced by the Torbrit mine from 1949 to 1959.

Some silver is associated with galena, while other is recovered from gold and copper ores, and although the silver in such ores is usually no more than a fraction of an ounce per ton, even that amount is important in a large tonnage operation.

Production of silver began in 1887 from silver-copper and silver-lead ores in the Kootenays and has continued in this area to the present. A considerable amount of the silver is a by-product of lead-zinc ores and nearly all is refined at Trail, although some is exported with concentrates to foreign smelters. By 1982 the Sullivan mine has accounted for 45.1 per cent of the total silver production of the province. In 1982 Equity Silver produced 52.3 per cent of the total silver produced in that year.

Significant amounts are contributed by the Bethlehem, Lynx, Lornex, Island Copper, Afton, Silmonac, and Baker mines. Table 3-12 details the current silver production. A former important mine, the Premier near Stewart, produced more than 1.3 million kilograms of silver between 1918 and 1968. *See* Tables 3-1, 3-3, 3-6, and 3-7B.

In 1981, silver totals include 54 505 grams, valued at $19 164, recovered and paid for in the placer gold.

Sodium Antimonate--In 1982, Equity Silver produced 70 214 kilograms of sodium antimonate.

Sodium Carbonate--Sodium carbonate was recovered between 1921 and 1949 from alkali lakes in the Clinton area and around Kamloops. There has been no further production. *See* Tables 3-1 and 3-7D.

Sodium Sulphate--In 1982, Equity Silver produced 44.37 wet tonnes of sodium sulphate.

Stone (See Building-stone)--Cut stone for building purposes is prepared from rock produced at quarries in various parts of the province when required. Two of the most productive quarries have operated on Haddington and Nelson Islands. *See* Tables 3-1, 3-3, and 3-7E.

Structural materials--In Table 3-7E the value of $5 972 171 for unclassified materials is the total for structural materials in the period 1886-1919 that cannot be allotted to particular classes of structural materials or assigned to mining divisions, and includes $726 323 shown against 1896 in Table 3-2 that includes unclassified structural materials in that and previous years not assignable to particular years. The figure $3 180 828 in Table 3-7E under "Other Clay Products" is the value in the period 1886-1910 that cannot be allotted to particular clay products or assigned to mining divisions. *See* Tables 3-1, 3-2, 3-3, 3-7A, and 3-7E.

The production of sulphur has been recorded since 1916. From 1916 to 1927 the amounts include the sulphur content of pyrite shipped. From 1928 the amounts include the estimated sulphur content of pyrite shipped, plus the sulphur contained in sulphuric acid made from waste smelter gases. The sulphur content of pyrrhotite roasted at the Kimberley fertilizer plant is included since 1953. Elemental sulphur has been recovered from the Westcoast Transmission Co. Ltd. plant at Taylor since 1958 and the Fort Nelson plant of Petrosul International Ltd. since 1978. *See* Tables 3-1, 3-3, and 3-7D.

Talc--Between 1916 and 1936, talc was quarried at Leech River and at Anderson Lake to make dust for asphalt roofing. There has been no production since 1936. *See* Tables 3-1 and 3-7D.

Thorium--*See* niobium.

Tin--Tin, as cassiterite, is a by-product of the Sullivan mine, where it has been produced since 1941. Tin is also produced in a lead-tin alloy at the Trail smelter. *See* Tables 3-1, 3-3, and 3-7C.

Tungsten--Tungsten, very largely as scheelite concentrates, was produced from 1937 to 1958, first from the Columbia Tungstens (Hardscrabble) mine in the Cariboo in 1937 and during World War II from the Red Rose mine near Hazelton and the Emerald mine near Salmo. The Red Rose closed in 1954 and the Emerald in 1958. Small amounts of scheelite have been produced from the Bridge River, Revelstoke, and other areas where demand was high. In 1970, production began from the Invincible mine near Salmo, which closed in 1973.

A very small amount of wolframite came from Boulder Creek near Atlin. *See* Tables 3-1, 3-3, and 3-7C.

Uranium--*See* niobium.

Volcanic ash--The only recorded production of volcanic ash is 27 tonnes from the Cariboo Mining Division in 1954. *See* Table 3-7D.

Zinc--Zinc was first produced in 1905. For many years lead was the most valuable single metal, but in 1950 the annual value of production of zinc surpassed that of lead and in 1966 the total value of copper production exceeded that of zinc. In 1977 the production of zinc was exceeded by that of copper, molybdenum, asbestos, coal, crude oil, and natural gas. Zinc is invariably associated with lead, and most ores are mined for their combined values in zinc, lead, and silver, and rarely for their zinc content alone. Some zinc ores contain a valuable amount of gold, and zinc is associated with copper at Lynx mine. Modern practice is to concentrate and separate the zinc mineral (sphalerite) from the lead mineral (galena). Most of the zinc concentrates go to the zinc-recovery plant at Trail, are roasted, and are converted electronically to refined metal. Usually some concentrates are shipped to American or Japanese smelters.

About 78.5 per cent of the zinc that has been mined in British Columbia has originated in southeastern British Columbia, at the Sullivan mine, and at mines near Ainsworth, Invermere, Moyie Lake, Riondel, Salmo, Slocan, and Spillimacheen. Other production has come from mines at Portland Canal and Tulsequah and is coming from Buttle Lake and Callaghan Creek. The greatest zinc mine is the Sullivan, which contributed about 72 per cent of the total zinc production of the province. *See* Table 3-12 for details of current zinc producers.

Records for the period 1905 to 1908 show shipments totalling 17 096 tonnes of zinc ore and zinc concentrates of unstated zinc content. In 1918, revisions were made to some yearly totals for zinc to adjust them for recovery of zinc from slag treated at the Trail smelter. *See* Tables 3-1, 3-3, 3-6, and 3-7B.

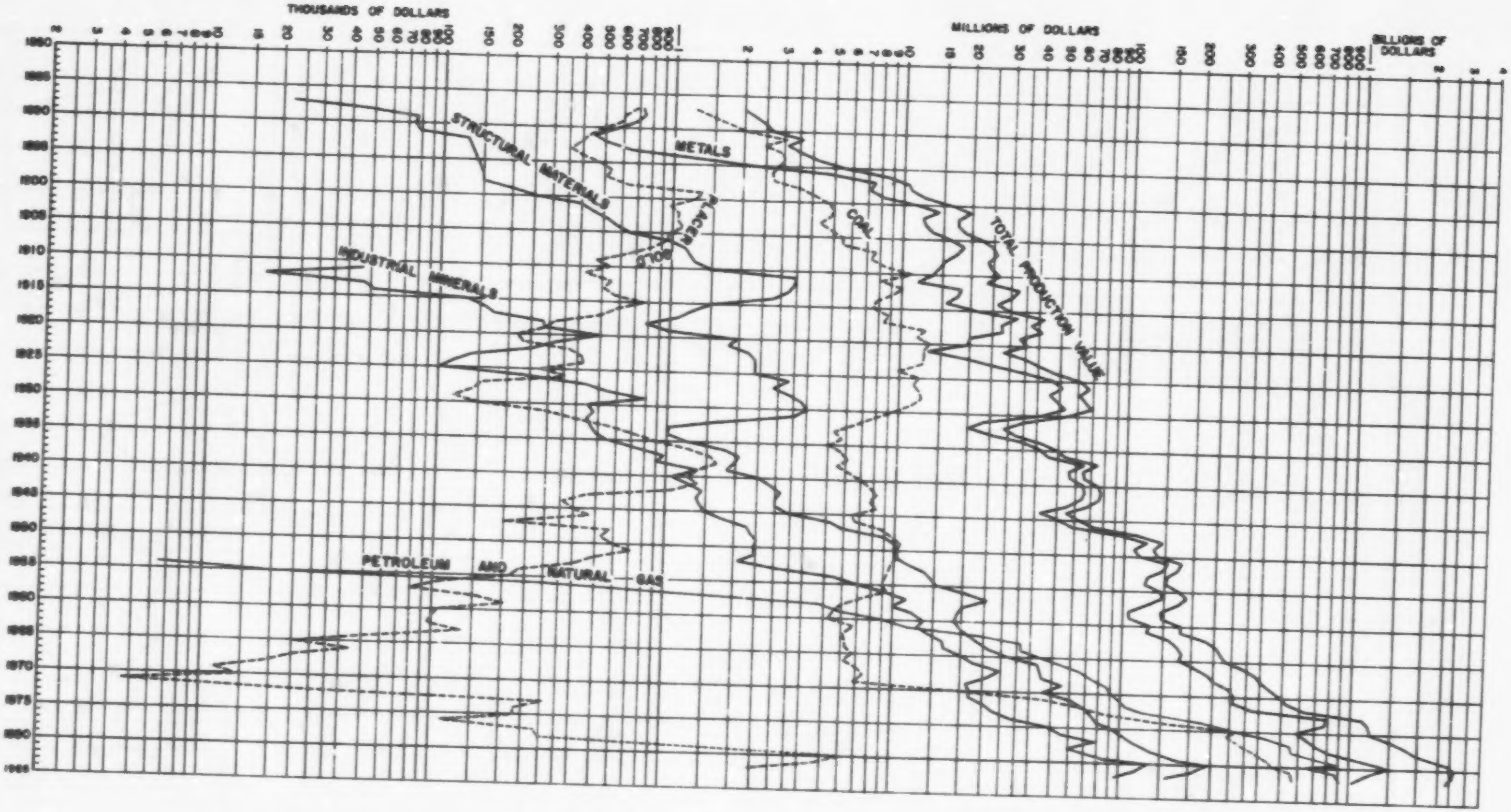

Figure 3-1. Value of Mineral Production, 1887-1982.

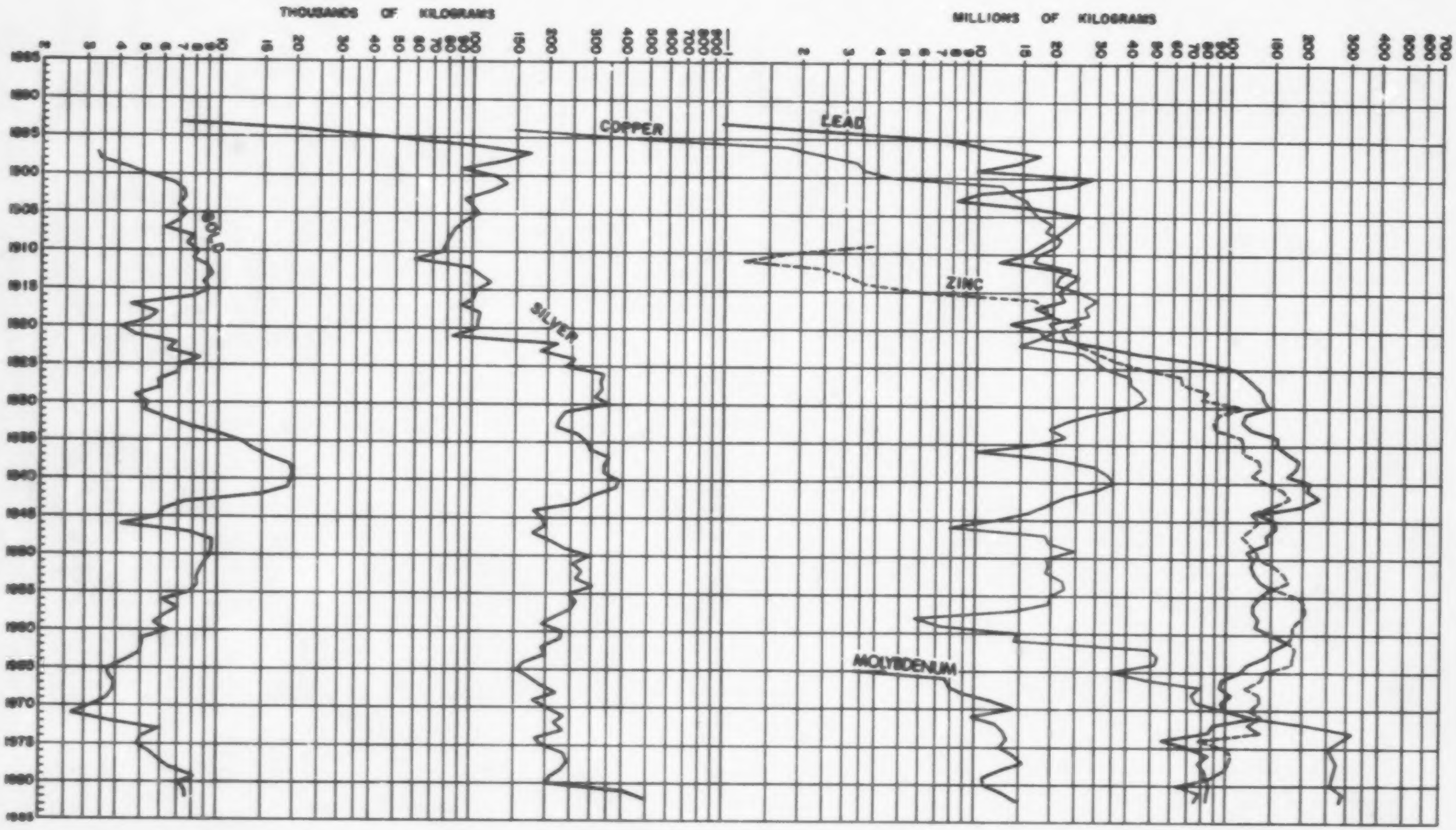

Figure 3-2. Production Quantities of Gold, Silver, Lead, Zinc, and Molybdenum, 1893-1982.

Prices[1] Used in Valuing Production of Gold, Silver, Copper, Lead, Zinc, and Coal

Year	Gold, Fine	Silver, Fine	Copper	Lead	Zinc	Coal
	$/g	$/g	$/kg	$/kg	$/kg	$/t
1901	0.66457	0.01801 N.Y.	0.355 N.Y.	0.057 N.Y.	....	2.92
1902	..	.01593 ..	.258 ..	.081 ..	....	2.90
1903	..	.01633 ..	.292 ..	.084 ..	....	2.94
1904	..	.01716 ..	.283 ..	.086 ..	....	2.89
1905	..	.01650 ..	.344 ..	.094 ..	....	2.98
1906	..	.02040 ..	.425 ..	.106 ..	....	2.88
1907	..	.01995 ..	.441 ..	.106 ..	....	3.38
1908	..	.01615 ..	.291 ..	.083 ..	....	3.43
1909	..	.01573 ..	.286 ..	.085 ..	....	3.52
1910	..	.01634 ..	.281 ..	.088 ..	0.101 E. St. L.	3.69
1911	..	.01628 ..	.273 ..	.088 ..	.108 ..	3.51
1912	..	.01858 ..	.360 ..	.089 ..	.130 ..	3.70
1913	..	.01826 ..	.337 ..	.087 ..	.106 ..	3.74
1914	..	.01675 ..	.300 ..	.077 ..	.097 ..	3.69
1915	..	.01518 ..	.381 ..	.092 ..	.248 ..	3.78
1916	..	.02006 ..	.600 ..	.136 ..	.240 ..	3.80
1917	..	.02487 ..	.599 ..	.174 ..	.167 ..	3.84
1918	..	.02956 ..	.543 ..	.147 ..	.153 ..	5.50
1919	..	.03394 ..	.412 ..	.114 ..	.138 ..	5.42
1920	..	.03080 ..	.385 ..	.158 ..	.144 ..	5.20
1921	..	.01914 ..	.276 ..	.090 ..	.087 ..	5.30
1922	..	.02062 ..	.295 ..	.114 ..	.107 ..	5.20
1923	..	.01981 ..	.318 ..	.144 ..	.124 ..	5.30
1924	..	.02040 ..	.287 ..	.161 ..	.119 ..	5.39
1925	..	.02221 ..	.310 ..	.173 Lond.	.174 Lond.	5.28
1926	..	.01997 ..	.304 ..	.149 ..	.163 ..	5.34
1927	..	.01812 ..	.285 ..	.116 ..	.137 ..	5.30
1928	..	.01870 ..	.321 ..	.101 ..	.121 ..	5.19
1929	..	.01704 ..	.399 ..	.111 ..	.119 ..	5.22
1930	..	.01227 ..	.286 ..	.087 ..	.079 ..	5.21
1931	..	.00923 ..	.179 ..	.060 ..	.056 ..	4.80
1932	.75459	.01018 ..	.141 Lond.	.047 ..	.053 ..	4.45
1933	.91953	.01216 ..	.164 ..	.053 ..	.071 ..	4.30
1934	1.10922	.01526 ..	.164 ..	.054 ..	.067 ..	4.41
1935	1.13140	.02083 ..	.172 ..	.069 ..	.068 ..	4.35
1936	1.12626	.01451 ..	.209 ..	.086 ..	.073 ..	4.66
1937	1.12497	.01443 ..	.288 ..	.113 ..	.108 ..	4.68
1938	1.13108	.01398 ..	.220 ..	.074 ..	.068 ..	4.42
1939	1.16195	.01302 ..	.223 ..	.070 ..	.068 ..	4.43
1940	1.23782	.01230 ..	.222 ..	.074 ..	.075 ..	4.70
1941	1.23782	.01230 ..	.222 ..	.074 ..	.075 ..	4.57
1942	1.23782	.01324 ..	.222 ..	.074 ..	.075 ..	4.55
1943	1.23782	.01455 ..	.259 ..	.083 ..	.088 ..	4.60
1944	1.23782	.01383 ..	.265 ..	.099 ..	.095 ..	4.68
1945	1.23782	.01511 ..	.277 ..	.110 ..	.142 ..	4.67
1946	1.18156	.02689 ..	.282 ..	.149 ..	.172 ..	5.16
1947	1.12529	.02315 ..	.450 ..	.301 ..	.248 ..	5.64
1948	1.12529	.02411 Mont.	.493 U.S.	.398 ..	.307 ..	6.71
1949	1.15744	.02387 U.S.	.440 ..	.348 U.S.	.292 U.S.	7.18
1950	1.22335	.02593 ..	.517 ..	.319 ..	.332 ..	7.09
1951	1.18477	.03040 ..	.611 ..	.406 ..	.439 ..	7.12
1952	1.10182	.02674 ..	.685 ..	.355 ..	.350 ..	7.65
1953	1.10665	.02693 ..	.669 ..	.292 ..	.235 ..	7.58
1954	1.09539	.02668 ..	.642 ..	.302 ..	.230 ..	7.72
1955	1.10986	.02825 ..	.844 ..	.329 ..	.267 ..	7.43
1956	1.10729	.02873 ..	.877 ..	.347 ..	.293 ..	7.26
1957	1.07867	.02799 ..	.574 ..	.310 ..	.246 ..	7.45
1958	1.09250	.02779 ..	.516 ..	.259 ..	.221 ..	8.21
1959	1.07932	.02812 ..	.611 ..	.257 ..	.242 ..	8.74
1960	1.09153	.02850 ..	.639 ..	.256 ..	.277 ..	7.32
1961	1.14008	.03012 ..	.620 ..	.243 ..	.258 ..	8.16
1962	1.20278	.03730 ..	.672 ..	.227 ..	.274 ..	8.19
1963	1.21371	.04436 ..	.676 ..	.265 ..	.290 ..	8.08
1964	1.21371	.04484 ..	.737 ..	.323 ..	.323 ..	7.65
1965	1.21307	.04481 ..	.846 ..	.380 ..	.345 ..	7.75
1966	1.21242	.04479 ..	1.176 ..	.359 ..	.344 ..	8.02
1967	1.21403	.05373 ..	1.125 ..	.333 ..	.329 ..	8.54
1968	1.21242	.07429 ..	1.195 ..	.321 ..	.312 ..	8.72
1969	1.21178	.06196 ..	1.470 ..	.354 ..	.347 ..	8.82

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[1] *See* page 70 for detailed explanation.

Prices[1] Used in Valuing Production of Gold, Silver, Copper, Lead, Zinc, and Coal—Continued

Year	Gold, Fine	Silver, Fine	Copper	Lead	Zinc	Coal
	$/g	$/g	$/kg	$/kg	$/kg	$/t
1970	1.17545	.05946 U.S.	1.294[2]	.360 U.S.	.353 U.S.	8.16
1971	1.13622	.05014 ,,	1.030[2]	.308 ,,	.359 ,,	11.06
1972	1.84934	.05348 ,,	.989[2]	.328 ,,	.388 ,,	12.08
1973	3.13185	.08251 ,,	1.835[2]	.359 ,,	.455 ,,	12.71
1974	5.34868[2]	.15653[2]	1.884[2]	.422[2]	.767[2]	19.93
1975	5.20466[2]	.15560[2]	1.283[2]	.346[2]	.808[2]	35.53
1976	4.03514[2]	.13571[2]	1.438[2]	.384[2]	.615[2]	39.63
1977	5.29972[2]	.15707[2]	1.398[2]	.541[2]	.591[2]	39.04
1978	7.32948[2]	.19832[2]	1.577[2]	.637[2]	.544[2]	40.35
1979	12.58090[2]	.44228[2]	2.412[2]	1.043[2]	.700[2]	41.56
1980	22.77657[2]	.76814[2]	2.534[2]	.862[2]	.732[2]	42.64
1981	17.53536[2]	.37751[2]	2.10723[2]	.725[2]	.846[2]	47.16
1982	**15.3847[2]**	**.31680**	**1.769**	**.514**	**.846**	**53.25**

[1] *See* page 70 for detailed explanation.

[2] *See* page 71 for explanation.

CONVERSION TABLE

Metric	**Symbol**
Tonnes	**t ÷ .90718 = short tons.**
Kilograms	**kg ÷ .45359 = pounds.**
Grams	**g ÷ 31.103 = troy ounces.**
Cubic metres	**m^3 × 6.29 = barrels.**
Thousand cubic metres	**10^3m^3 × 35.49373 = thousand standard cubic feet.**

Table 3-1—Mineral Production: Total to Date, Past Year, and Latest Year

Products[1]		Total Quantity to Date	Total Value to Date	Quantity, 1981	Value, 1981	Quantity, 1982	Value, 1982
Metals			$		$		$
Antimony	kg	27 677 256	30 178 766	68 323	360 745	213 519	1 161 543
Bismuth	kg	3 393 166	16 495 306	47 300	102 641	27 305	83 007
Cadmium	kg	21 063 659	89 625 752	101 962	371 077	147 656	286 265
Chromite	t	722	32 295				
Cobalt	kg	114 484	376 661				
Copper	kg	5 054 248 094	6 537 382 666	290 088 241	611 282 050	279 873 599	495 009 799
Gold—							
placer	g	164 142 225	114 335 931	291 705	4 540 289	175 607	2 467 470
lode, fine	g	599 713 546	1 197 563 070	7 468 769	131 542 422	7 511 908	115 802 480
Iron concentrates	t	35 802 306	403 789 672	602 272	14 274 498	774 951	19 630 010
Lead	kg	8 165 694 885	1 875 324 399	84 854 093	61 529 276	83 746 551	43 035 587
Magnesium	kg	92 819	88 184				
Manganese	t	1 564	32 668				
Mercury	kg	6 094 387	49 218 263				
Molybdenum	kg	209 806 172	1 835 736 557	12 933 224	198 240 391	14 747 888	154 990 970
Nickel	kg	23 337 783	51 698 754				
Palladium	g	23 296	30 462				
Platinum	g	44 042	138 801				
Selenium	kg	332	1 389				
Silver	g	18 191 926 232	1 132 670 203	403 754 797	152 420 716	499 565 577	158 260 320
Tin	kg	10 064 705	35 368 236	150 341	2 198 138	115 261	1 568 666
Tungsten (WO$_3$)	kg	9 194 732	49 182 366			104 730	1 114 350
Zinc	kg	7 732 494 966	2 110 225 008	79 214 552	67 026 535	75 182 699	63 571 545
Others			41 967 873		2 793 757		506 368
Totals			15 571 463 282		1 246 682 535		1 057 488 380
Industrial Minerals							
Arsenious oxide	kg	9 987 789	273 201				
Asbestos	t	1 870 487	742 988 610	90 914	76 770 285	76 084	57 032 422
Bentonite	t	718	16 858				
Fluxes	t	4 083 355	10 156 862	48 313	509 678	53 801	1 018 576
Granules	t	708 286	20 270 552	28 297	1 756 810	20 962	1 400 812
Gypsum and gypsite	t	10 089 574	51 067 507	684 924	5 804 770	415 458	5 468 093
Hydromagnesite	t	2 044	27 536				
Iron oxide and ochre	t	16 427	155 050				
Jade	kg	2 725 803	8 845 812	59 208	133 598	78 681	320 861
Magnesium sulphate	t	12 604	254 352				
Mica	kg	5 815 954	185 818				
Natro-alunite	t	474	9 398				
Perlite	t	1 009	11 120				
Phosphate rock	t	3 485	16 894				
Sodium carbonate	t	9 518	118 893				
Sulphur	t	10 366 858	220 580 071	907 506	33 337 562	423 892	29 115 860
Talc	t	984	34 871				
Others			21 213 191		4 152 139		1 287 594
Totals			1 076 226 686		122 464 842		95 644 218
Structural Materials							
Cement	t	23 219 437	804 422 056	955 922	82 372 375	749 571	69 265 713
Clay products			164 201 348		10 292 772		5 853 261
Lime and limestone	t		128 942 139	2 659 406	9 400 205	2 575 441	10 465 577
Rubble, rip-rap, crushed rock	t		160 340 834	3 168 694	11 105 388	2 652 976	12 898 647
Sand and gravel	t		913 780 425	42 361 930	87 603 864	26 702 329	65 648 899
Building stone	t		9 421 827	383	11 875	145	24 547
Not assigned			5 972 171				
Totals			2 187 080 800		200 786 479		164 156 644
Coal							
Coal—sold and used	t	234 055 322	4 339 145 527	11 752 621	554 271 292	10 645 742	506 878 240
Petroleum and Natural Gas							
Crude oil	m^3	56 593 057	2 069 103 694	2 035 953	236 170 548	2 078 258	333 892 930
Field condensate	m^3	336 728	19 989 151	27 871	3 233 036	20 771	3 337 069
Plant condensate	m^3	3 682 043	99 266 023	124 946	13 284 259	135 185	19 765 399
Natural gas to pipeline	10^{3}m^3	161 253 788	4 221 130 514	8 062 681	616 795 096	7 188 561	542 664 470
Butane	m^3	1 921 976	53 711 528	84 635	9 953 076	89 443	9 436 236
Propane	m^3	1 516 640	34 661 844	64 118	5 080 069	68 783	3 806 451
Totals			6 497 862 754		884 516 084		912 902 555
Grand Totals			29 671 779 049		3 008 721 232		2 797 070 037

[1] *See* notes on individual products listed alphabetically on pages 73 to 87.

[2] *See* page 92 for conversion table to old system.

Table 3-2—Total Value of Mineral Production, 1836–1982

Year	Metals	Industrial Minerals	Structural Materials	Coal	Petroleum and Natural Gas	Total
	$	$	$	$	$	$
1836–86	52 808 750		43 650	10 758 565		63 610 965
1887	729 381		22 168	1 240 080		1 991 629
1888	745 794		46 432	1 467 903		2 260 129
1889	685 512		77 517	1 739 490		2 502 519
1890	572 884		75 201	2 034 420		2 682 505
1891	447 136		79 475	3 087 291		3 613 902
1892	511 075		129 234	2 479 005		3 119 314
1893	659 969			2 934 882		3 594 851
1894	1 191 728			3 038 859		4 230 587
1895	2 834 629			2 824 687		5 659 316
1896	4 973 769		726 323	2 693 961		8 394 053
1897	7 575 262		150 000	2 734 522		10 459 784
1898	7 176 870		150 000	3 582 595		10 909 465
1899	8 107 509		200 000	4 126 803		12 434 312
1900	11 360 546		250 000	4 744 530		16 355 076
1901	14 258 455		400 000	5 016 398		19 674 853
1902	12 163 561		450 000	4 832 257		17 445 818
1903	12 640 083		525 000	4 332 297		17 497 380
1904	13 424 755	2 400	575 000	4 953 024		18 955 179
1905	16 289 165		660 800	5 511 861		22 461 826
1906	18 449 602		982 900	5 548 044		24 980 546
1907	17 101 305		1 149 400	7 637 713		25 888 418
1908	15 277 991		1 200 000	7 306 866		23 784 857
1909	14 668 141		1 270 559	8 574 884		24 513 584
1910	13 768 731		1 500 000	11 108 335		26 377 066
1911	11 880 062	46 345	3 500 917	8 071 747		23 499 071
1912	18 218 266	17 500	3 436 222	10 786 812		32 458 800
1913	17 701 432	46 446	3 249 605	9 197 460		30 194 943
1914	15 790 727	51 810	2 794 107	7 745 847		26 382 491
1915	20 765 212	133 114	1 509 235	7 114 178		29 521 739
1916	32 092 648	150 718	1 247 912	8 900 675		42 391 953
1917	27 299 934	174 107	1 097 900	8 484 343		37 056 284
1918	27 957 302	281 131	783 280	12 833 994		41 855 707
1919	20 058 217	289 426	980 790	11 975 671		33 304 104
1920	19 687 532	508 601	1 962 824	13 450 169		35 609 126
1921	13 160 417	330 503	1 808 392	12 836 013		28 135 325
1922	19 605 401	251 922	2 469 967	12 880 060		35 207 350
1923	25 769 215	140 409	2 742 388	12 678 548		41 330 560
1924	35 959 566	116 932	2 764 013	9 911 935		48 752 446
1925	46 480 742	101 319	2 766 838	12 168 905		61 517 804
1926	51 867 792	223 748	3 335 885	11 650 180		67 077 605
1927	45 134 289	437 729	2 879 160	12 269 135		60 720 313
1928	48 640 158	544 192	3 409 142	12 633 510		65 227 002
1929	52 805 345	807 502	3 820 732	11 256 260		68 689 839
1930	41 785 380	457 225	4 085 105	9 435 650		55 763 360
1931	23 530 469	480 319	3 538 519	7 684 155		35 233 462
1932	20 129 869	447 495	1 705 708	6 523 644		28 806 716
1933	25 777 723	460 683	1 025 586	5 375 171		32 639 163
1934	35 177 224	486 554	1 018 719	5 725 133		42 407 630
1935	42 006 618	543 583	1 238 718	5 048 864		48 837 783
1936	45 889 944	724 362	1 796 677	5 722 502		54 133 485
1937	65 224 245	976 171	2 098 339	6 139 920		74 438 675
1938	55 959 713	916 641	1 974 976	5 565 069		64 416 599
1939	56 216 049	1 381 720	1 832 464	6 280 956		65 711 189
1940	64 332 166	1 073 023	2 534 840	7 088 265		75 028 294
1941	65 807 630	1 253 561	2 845 262	7 660 000		77 566 453
1942	63 626 140	1 434 382	3 173 635	8 237 172		76 471 329
1943	55 005 394	1 378 337	3 025 255	7 742 030		67 151 016
1944	42 095 013	1 419 248	3 010 088	8 217 966		54 742 315
1945	50 673 592	1 497 720	3 401 229	6 454 360		62 026 901
1946	58 834 747	1 783 010	5 199 563	6 732 470		72 549 790
1947	95 729 867	2 275 972	5 896 803	8 680 440		112 583 082
1948	124 091 753	2 358 877	8 968 222	9 765 395		145 184 247
1949	110 219 917	2 500 799	9 955 790	10 549 924		133 226 430
1950	117 166 836	2 462 340	10 246 939	10 119 303		139 995 418

Table 3-2—Total Value of Mineral Production, 1836–1982—Continued

Year	Metals	Industrial Minerals	Structural Materials	Coal	Petroleum and Natural Gas	Total
	$	$	$	$	$	$
1951	153 598 411	2 493 840	10 606 048	10 169 617		176 867 916
1952	147 857 523	2 181 464	11 596 961	9 729 739		171 365 687
1953	126 755 705	3 002 673	13 555 038	9 528 279		152 841 695
1954	123 834 286	5 504 114	14 395 174	9 154 544	6 545	152 894 663
1955	142 609 505	6 939 490	15 299 254	8 906 501	18 610	173 853 360
1956	149 441 246	9 172 792	20 883 631	9 346 518	319 465	189 163 652
1957	125 353 920	11 474 050	25 626 939	7 340 139	1 197 581	170 992 829
1958	104 251 112	9 958 768	19 999 576	5 937 860	4 806 233	144 951 549
1959	105 076 530	12 110 286	19 025 209	5 472 064	5 967 128	147 651 217
1960	130 304 373	13 762 102	18 829 909	5 242 223	9 226 646	177 365 333
1961	128 565 774	12 948 388	19 878 921	6 802 134	11 612 184	179 807 321
1962	159 627 293	14 304 214	21 366 265	6 133 986	27 939 726	229 171 464
1963	172 852 866	16 510 898	23 882 180	6 237 997	36 379 636	255 863 587
1964	180 926 329	16 989 469	26 428 939	6 327 678	36 466 753	267 139 168
1965	177 101 733	20 409 649	32 325 714	6 713 590	44 101 662	280 652 348
1966	208 664 003	22 865 324	43 780 272	6 196 219	54 274 187	335 780 005
1967	235 865 318	29 364 065	44 011 488	7 045 341	67 096 286	383 382 498
1968	250 912 026	26 056 782	45 109 476	7 588 989	75 281 215	405 028 488
1969	294 881 114	20 492 943	55 441 528	6 817 155	86 756 089	464 388 749
1970	309 981 470	22 020 359	46 104 071	19 550 660	90 974 467	488 640 036
1971	301 059 951	21 909 767	59 940 333	45 801 936	99 251 158	527 963 145
1972	372 032 770	25 764 120	66 745 608	66 030 210	105 644 978	636 217 776
1973	795 617 596	27 909 664	73 720 831	87 976 105	124 104 445	1 109 388 641
1974	764 599 451	33 676 214	78 088 393	154 593 643	233 275 909	1 264 233 306
1975	586 650 344	48 667 602	90 928 011	317 111 744	320 719 474	1 304 077 175
1976	646 750 403	52 917 142	100 938 648	298 683 679	420 973 564	1 520 263 436
1977	714 036 707	79 185 099	115 650 992	328 846 883	550 439 856	1 788 159 537
1978	819 778 518	59 471 361	142 105 285	381 895 241	568 931 051	1 972 181 456
1979	1 350 776 761	83 100 984	187 671 941	439 280 152	896 377 125	2 957 206 963
1980	1 429 002 180	115 926 007	242 325 657	461 492 857	828 302 626	3 077 049 327
1981	1 246 682 535	122 464 842	280 780 279	554 271 292	884 516 084	3 088 721 032
1982	1 057 488 380	95 644 218	164 156 644	566 878 240	912 902 555	2 797 070 037
Totals	15 571 463 282	1 076 226 686	2 187 080 800	4 339 145 527	6 497 862 754	29 671 779 049

Table 3-3—Mineral Production for the 10 Years, 1973-1982

Description	1973		1974		1975		1976		1977	
	Quantity	Value	Quantity	Value	Quantity	Value	Quantity	Value	Quantity	Value
Metals		$		$		$		$		$
Antimony kg	753 110	1 192 118	221 238	879 897	364 045	1 467 928	447 001	1 636 871	596 207	2 519 739
Bismuth kg	1 293	13 058	33 711	680 771	19 163	261 931	20 261	226 462	18 540	187 612
Cadmium kg	367 761	2 951 236	195 979	1 532 096	320 923	1 971 035	356 422	1 530 800	320 711	1 720 051
Cobalt kg	18 555	117 403								
Copper kg	317 603 055	582 803 251	287 547 048	541 644 913	258 497 599	331 693 850	263 618 197	378 984 941	275 224 115	384 736 661
Gold—placer g	119 156	311 524	45 162	232 512	43 744	232 204	26 064	115 613	46 170	289 075
lode, fine g	5 784 723	18 117 268	5 001 082	26 749 083	4 819 241	25 082 494	5 393 477	21 761 502	5 906 336	31 301 931
Iron concentrates t	1 420 160	12 906 063	1 306 930	12 742 227	1 305 840	15 273 878	1 255 277	14 760 526	445 317	7 362 345
Lead kg	84 890 924	30 477 936	55 252 692	23 333 016	70 603 483	24 450 158	85 407 582	32 796 533	78 172 646	42 316 293
Molybdenum kg	13 785 264	51 851 509	13 789 825	60 791 552	13 026 627	71 201 391	14 088 686	94 109 138	15 521 970	142 057 947
Nickel kg	1 119 221	3 775 232	688 656	2 351 406						
Silver g	236 987 318	19 552 997	181 695 950	28 440 365	196 305 885	30 545 947	239 720 882	32 532 836	241 503 007	37 934 098
Tin kg	138 221	597 265	143 816	1 150 722	32 511	200 669	102 262	712 912	187 478	1 912 300
Tungsten (WO_3) kg	640 378	4 224 062								
Zinc kg	137 380 768	62 564 751	77 733 732	59 582 753	99 668 230	80 572 872	106 498 987	65 499 108	103 780 228	61 301 001
Others		4 161 923		4 488 138		3 695 987		2 083 161		397 654
Subtotals		795 617 596		764 599 451		586 650 344		646 750 403		714 036 707
Industrial Minerals										
Asbestos t	98 852	21 102 892	83 403	27 398 900	76 771	37 849 743	90 443	40 727 296	97 033	69 729 205
Diatomite t	513	9 526	1 593	32 600	5 847	229 483	2 737	182 159	1 239	49 595
Fluxes (quartz, limestone) t	41 937	106 371	34 451	206 049	35 914	174 824	11 378	33 263	28 624	95 461
Granules (quartz, limestone, granite) t	31 135	857 643	31 546	1 025 615	33 316	1 144 968	31 476	1 219 884	29 551	1 238 485
Gypsum and gypsite t	331 347	1 114 009	400 338	1 412 157	474 387	1 751 799	556 134	4 434 471	653 126	2 357 488
Jade kg	69 967	306 808	3 510	18 613	110 437	414 123	483 796	1 535 030	266 621	825 523
Sulphur t	286 701	4 187 387	206 646	3 068 507	246 079	5 738 134	231 704	4 296 189	248 892	3 871 660
Others		285 028		513 773		1 364 528		488 850		1 017 682
Subtotals		27 969 664		33 676 214		48 667 602		52 917 142		79 185 099
Structural Materials										
Cement t	862 521	24 935 624	890 372	25 828 823	915 293	31 681 722	846 548	34 973 746	909 522	42 705 320
Clay products		5 590 290		6 615 128		6 593 189		6 955 917		4 909 799
Lime and limestone t	1 954 008	3 633 870	2 097 909	4 297 547	1 976 415	4 349 800	2 173 831	5 610 063	2 231 166	5 861 614
Rubble, riprap, and crushed rock t	2 579 122	4 160 009	2 691 473	5 715 219	4 103 452	8 723 448	2 485 215	5 205 973	2 464 503	7 309 536
Sand and gravel t	30 811 402	35 379 590	31 440 908	35 611 346	28 945 523	39 575 457	36 073 618	48 138 635	53 994 528	54 809 121
Building-stone t	729	21 448	452	20 330	53	4 395	657	14 314	4 535	55 602
Subtotals		73 720 831		78 088 393		90 928 011		100 938 648		115 650 992
Coal										
Sold and used t	6 924 733	87 976 105	7 757 440	154 593 643	8 924 816	317 111 744	7 537 695	298 683 679	8 424 181	328 846 883
Total solid minerals		985 284 196		1 030 957 701		1 043 357 701		1 099 289 872		1 237 719 681
Petroleum and Natural Gas										
Crude oil m^3	3 368 902	68 306 032	3 012 501	103 335 328	2 269 898	94 229 725	2 367 450	116 595 050	2 200 303	132 859 085
Field condensate m^3	20 114	407 807	16 561	568 075	16 094	668 092	18 309	901 711	24 465	1 477 248
Plant condensate m^3	180 088	222 463	178 534	924 549	185 272	6 525 837	167 576	7 198 957	180 267	9 751 058
Natural gas delivered to pipeline 10^3m^3	10 789 269	54 762 105	9 016 996	128 018 726	9 236 489	214 733 528	8 799 508	287 997 059	8 895 663	396 601 354
Butane m^3	109 057	212 640	105 426	232 085	106 427	2 577 205	109 781	4 591 832	111 357	5 358 167
Propane m^3	99 188	193 398	89 373	196 742	81 975	1 985 087	88 195	3 688 955	91 297	4 392 944
Total petroleum and natural gas		124 104 445		233 275 505		320 719 474		420 973 564		550 439 856
Grand totals		1 109 388 641		1 264 233 206		1 364 077 175		1 520 263 436		1 788 159 537

Table 3-3—Mineral Production for the 10 Years, 1973–1982—Continued

Description	1978		1979		1980		1981		1982	
	Quantity	Value	Quantity	Value	Quantity	Value	Quantity	Value	Quantity	Value
Metals		$		$		$		$		$
Antimony kg	459 521	2 083 895	177 046	916 081	78 654	416 080	68 323	360 745	213 519	1 161 543
Bismuth kg	28 172	166 452	33 809	173 667	23 501	136 306	47 300	102 641	27 305	83 007
Cadmium kg	253 803	1 186 320	239 096	1 417 506	92 360	560 679	101 962	371 077	147 656	286 265
Cobalt kg										
Copper kg	273 692 676	431 694 395	272 163 001	656 359 923	264 674 830	670 623 616	290 088 241	611 282 050	279 873 599	495 009 799
Gold—placer g	36 515	295 001	214 106	2 649 918	280 104	6 213 376	291 705	4 540 289	175 607	2 467 470
lode, fine g	6 542 332	47 951 880	8 062 810	101 481 156	7 197 312	163 930 073	7 468 769	131 542 422	7 511 908	115 802 480
Iron concentrates t	615 569	11 597 462	668 026	13 008 475	653 324	13 670 233	602 272	14 274 498	774 951	19 630 010
Lead kg	81 064 539	51 640 564	84 451 905	88 100 363	76 709 447	66 096 223	84 854 093	61 529 276	83 746 551	43 035 587
Molybdenum kg	13 055 203	167 714 272	10 766 497	321 228 104	11 209 501	288 934 398	12 933 244	198 240 391	14 747 888	154 990 970
Platinum g			280	3 793						
Silver g	227 271 890	45 071 509	214 117 518	94 700 656	203 801 811	156 548 306	403 754 797	152 420 716	499 565 577	158 260 320
Tin kg	261 863	3 675 508	240 984	3 818 948	139 517	2 438 881	150 341	2 198 138	115 261	1 568 666
Tungsten (WO$_3$) kg									104 730	1 114 350
Zinc kg	95 618 111	52 048 701	88 418 642	61 890 891	67 481 328	49 363 417	79 214 552	67 026 535	75 182 699	63 571 545
Others		4 652 559		5 027 280		10 070 592		2 793 757		506 368
Subtotals		819 778 518		1 350 776 761		1 429 002 180		1 246 682 535		1 057 488 380
Industrial Minerals										
Asbestos t	68 266	47 066 170	94 286	65 520 069	100 089	81 688 936	90 914	76 770 285	76 084	57 032 422
Diatomite t	2 184	59 346	1 452	33 025	3 615	138 273	3 600	155 232	137	6 850
Fluxes (quartz, limestone) t	22 475	56 894	27 741	129 035	43 986	93 135	48 313	509 678	53 801	1 018 576
Granules (quartz, limestone, granite) t	26 849	1 186 160	30 074	1 458 987	31 393	1 694 947	28 297	1 756 810	20 962	1 400 812
Gypsum and gypsite t	733 080	3 110 695	718 557	3 782 628	751 067	5 387 949	684 924	5 804 770	415 458	5 468 093
Jade kg	488 759	1 422 018	258 505	1 325 777	449 156	1 580 241	59 208	133 598	78 681	320 861
Sulphur t	322 181	5 647 993	383 724	9 616 390	359 413	21 712 359	507 566	33 337 562	423 892	29 115 860
Others		922 085		1 235 073		3 630 167		3 996 907		1 280 744
Subtotals		59 471 361		83 100 984		115 926 007		122 464 842		95 644 218
Structural Materials										
Cement t	1 020 065	56 140 564	1 550 596	89 185 273	1 351 320	90 881 086	955 922	82 372 375	749 571	69 265 713
Clay products		6 282 560		11 744 194		10 387 121		10 292 772		5 853 261
Lime and limestone t	2 512 867	6 929 484	2 880 138	8 037 476	3 129 762	9 945 044	2 659 406	9 400 205	2 575 441	10 465 577
Rubble, riprap, and crushed rock t	2 841 920	8 410 065	2 488 389	6 766 665	7 019 167	32 436 456	3 168 694	11 100 383	2 652 976	12 898 647
Sand and gravel t	38 353 326	64 324 582	46 241 983	71 918 633	45 278 202	98 666 100	42 361 930	87 603 864	26 702 329	65 648 899
Building-stone t	405	18 030	2 194	19 700	91	9 850	383	11 875	145	24 547
Subtotals		142 105 285		187 671 941		242 325 657		200 786 479		164 156 644
Coal										
Sold and used t	9 463 920	381 895 241	10 570 370	439 280 152	10 823 530	461 492 857	11 752 621	554 271 292	10 645 742	566 878 240
Total solid minerals		1 403 250 405		2 060 829 838		2 248 746 701		2 124 205 148		1 884 167 482
Petroleum and Natural Gas										
Crude oil m^3	2 004 699	145 005 524	2 139 963	168 928 671	2 002 128	189 561 479	2 035 953	236 170 548	2 078 258	333 892 930
Field condensate m^3	25 386	1 836 217	32 549	2 569 418	36 885	3 489 431	27 871	3 233 036	20 771	3 337 069
Plant condensate m^3	155 503	10 269 861	184 398	13 396 500	133 601	11 641 991	124 946	13 284 259	135 185	19 765 399
Natural gas delivered to pipeline 10^{3}m^3	8 003 029	401 373 236	11 392 641	699 508 127	8 931 833	612 545 107	8 062 681	616 795 096	7 188 561	542 664 470
Butane m^3	106 580	5 932 766	112 683	7 122 711	89 556	6 491 914	84 635	9 953 076	89 443	9 436 236
Propane m^3	85 732	4 513 447	84 864	4 851 698	75 507	4 572 704	64 118	5 080 069	68 783	3 806 451
Total petroleum and natural gas		568 931 051		896 377 125		828 302 626		884 516 084		912 902 555
Grand totals		1 972 181 456		2 957 206 963		3 077 049 327		3 008 721 232		2 797 070 037

Table 3-4—Comparison of Total Quantity and Value of Production, and Quantity and Value of Production Paid for to Mines

Metals	Units	1982 Total Production		1982 Production Paid for to Mines	
		Quantity	Value	Quantity	Value
			$		$
Antimony	kg	213 519	1 161 543	....	....
Bismuth	kg	27 305	83 007	1 510	5 246
Cadmium	kg	147 656	286 265	16 278	33 432
Copper	kg	279 873 599	495 009 799	279 553 488	315 307 588
Gold—placer	g	175 607	2 467 470	175 607	2 467 470
Gold—lode, fine	g	7 511 908	115 802 480	7 511 908	93 012 912
Iron concentrates	t	774 951	19 630 010	774 951	19 630 010
Lead	kg	83 746 551	43 035 587	73 046 393	24 905 526
Molybdenum	kg	14 747 888	154 990 970	14 747 888	154 990 970
Silver	g	499 565 577	158 260 320	479 345 473	110 924 669
Tin	kg	115 261	1 568 666	115 261	1 512 993
Zinc	kg	75 182 699	63 571 545	68 092 370	43 221 775
Others		....	1 620 718	....	1 228 888
Totals		....	1 057 488 380	....	767 241 479

NOTE: For metals, the total quantity and value of production include the quantities paid for to the mines, and the smelter and refining production that can be attributed to the mines but is not paid for. The quantity and value paid for to the mines, excluding outward transportation costs, smelting and refining costs, penalties and deductions, are shown separately for comparative purposes.

Table 3-5—Exploration and Development Expenditures, 1974–1982

	Physical Work and Surveys	Administration, Overhead, Land Costs, Etc.	Construction, Machinery and Equipment, Other Capital Costs	Totals
A. Exploration on Undeclared Mines	$	$	$	$
Metal mines—				
1974	18 773 326	6 525 878	128 144	25 427 348
1975	16 366 152	5 298 367	442 327	22 106 846
1976	20 437 180	6 365 331	381 416	27 183 927
1977	19 097 099	6 974 231	106 059	26 177 389
1978	22 724 774	5 715 214	1 035 353	29 475 341
1979	42 789 552	10 438 163	583 114	53 810 829
1980	74 378 109	14 367 266	4 107 339	92 852 714
1981	88 908 669	19 060 910	10 976 496	118 946 075
1982	30 868 724	11 063 588	422 868	42 355 180
Coal mines—				
1974	3 450 746	884 849	18 958	4 354 553
1975	9 955 507	3 057 843	....	13 013 350
1976	9 234 269	3 678 893	....	12 913 162
1977	14 741 425	4 797 788	....	19 539 213
1978	15 289 351	4 511 572	....	19 800 923
1979	11 765 168	6 073 861	....	17 839 029
1980	9 830 425	5 703 387	....	15 533 812
1981	25 557 948	9 866 432	1 932	35 426 312
1982	7 596 523	4 194 832	....	11 791 355
Others—				
1974	42 706	11 134	....	53 840
1975	90 025	35 679	....	125 704
1976	73 453	47 760	....	121 213
1977	327 113	9 860	222 092	559 065
1978	342 100	117 180	....	459 280
1979	135 062	149 131	....	284 193
1980	1 340 398	189 292	....	1 529 690
1981	808 742	30 870	367 106	1 206 718
1982	980 203	150 720	....	1 130 923
Totals—				
1974	22 266 778	7 421 861	147 102	29 835 741
1975	26 411 684	8 391 889	442 327	35 245 900
1976	29 744 902	10 091 984	381 416	40 218 302
1977	34 165 637	11 781 879	328 151	46 275 667
1978	38 356 225	10 343 966	1 035 353	49 735 544
1979	54 689 782	16 661 155	583 114	71 934 051
1980	85 548 932	20 259 945	4 107 339	109 916 216
1981	115 275 359	28 958 212	11 345 534	155 579 105
1982	39 445 450	15 409 140	422 868	55 277 458
B. Exploration on Declared or Operating Mines				
Metal mines—				
1974	2 652 243	762 224	278 500	3 692 967
1975	2 792 378	3 090 135	....	5 882 513
1976	8 359 413	83 304	....	8 442 717
1977	2 988 366	2 020 259	....	5 008 625
1978	6 562 912	1 729 402	....	8 292 314
1979	6 946 143	1 585 176	263 586	8 794 905
1980	26 712 536	4 345 682	2 551 716	33 609 934
1981	7 559 289	466 704	8 000	8 033 993
1981	4 508 057	7 947 145	....	12 455 202
Coal mines—				
1974	488 308	104 259	....	592 567
1975	1 000 000	....	....	1 000 000
1976	665 000	28 000	....	693 000
1977	5 978 043	25 115 000	....	31 093 043
1978	4 052 774	510 612	....	4 563 386
1979	3 376 551	398 984	....	3 775 535
1980	12 504 905	8 510 426	....	21 015 331
1981	6 008 376	348 780	....	6 357 156
1982	11 408 367	2 710 714	....	14 119 081

Table 3-5—Exploration and Development Expenditures, 1974–1982—Continued

	Physical Work and Surveys	Administration, Overhead, Land Costs, Etc.	Construction, Machinery and Equipment, Other Capital Costs	Totals
B. Exploration on Declared or Operating Mines—Continued	$	$	$	$
Others—				
1974	4 236	....	....	4 236
1975	36 242	2 700	....	38 942
1976	214 081	30 000	....	244 081
1977	106 896	403 300	....	510 196
1978	12 025	....	....	12 025
1979	35 200	....	1 300	36 500
1980	187 332	....	....	187 332
1981	60 300	7 350	....	67 650
1982	36 900	9 300	....	46 200
Totals—				
1974	3 144 787	866 483	278 500	4 289 770
1975	3 828 620	3 092 835	....	6 921 455
1976	9 238 494	141 304	....	9 379 798
1977	9 073 305	27 538 559	....	36 611 864
1978	10 627 711	2 240 014	....	12 867 725
1979	10 357 894	1 984 160	264 886	12 606 940
1980	39 404 773	12 856 108	2 551 716	54 812 597
1981	13 627 965	822 834	8 000	14 458 799
1982	15 953 324	10 667 159	....	26 620 483
C. Development on Declared Mines				
Metal mines—				
1974	1 280 513	1 028 199	1 985 000	4 293 712
1975	....	57 166	840 344	897 510
1976	512 197	974 985	12 447 569	13 934 751
1977	380 419	1 132 316	33 672 153	35 184 888
1978	133 335	895 892	....	1 029 227
1979	3 482 962	1 351 567	54 559 204	59 393 733
1980	83 119 989	736 527	23 446 243	107 302 759
1981	19 072 107	6 888 019	29 993 101	55 953 227
1982	11 022 201	425 555	4 577 981	16 025 737
Coal mines—				
1974	320 098	256 055	111 500	687 653
1975	....	....	....	....
1976	1 425 312	583 304	....	2 008 616
1977	1 725 484	247 313	....	1 972 797
1978	30 957	38 910	....	69 867
1979	981 517	350 157	....	1 331 674
1980	3 296 000	69 000	43 280 261	46 645 261
1981	7 812 359	1 771 320	115 229 391	124 813 070
1982	323 078 469	341 915	....	323 420 384
Others—				
1974	23 242	37 988	2 883 584	2 944 814
1975	....	....	....	....
1976	....	3 155	18 001 500	18 004 655
1977	64 689	708	40 000	105 397
1978	7 045	2 159	10 000	19 204
1979	....	....	....	....
1980	....	....	....	....
1981	....	....	....	....
1982	....	....	....	....
Totals—				
1974	1 623 853	1 322 242	4 980 084	7 926 179
1975	....	57 166	840 344	897 510
1976	1 937 509	1 561 444	30 449 069	33 948 022
1977	2 170 592	1 380 337	33 712 153	37 263 082
1978	171 337	936 961	10 000	1 118 298
1979	4 464 479	1 701 724	54 559 204	60 725 407
1980	86 415 989	805 527	66 726 504	153 948 020
1981	26 884 466	8 659 339	145 222 492	180 766 297
1982	334 100 670	767 470	4 577 981	339 446 121
D. Development on Operating Mines				
Metal mines—				
1974	20 933 501	1 722 680	46 732 326	69 388 507
1975	9 013 375	5 804 924	24 548 602	39 366 901
1976	6 937 229	404 226	41 881 126	49 222 581
1977	14 491 378	1 722 479	45 859 006	62 072 863
1978	10 424 872	575 164	17 908 816	28 908 852
1979	27 395 046	2 672 011	67 831 381	97 898 438
1980	33 379 015	2 541 622	250 726 066	286 646 703
1981	96 533 183	9 803 477	312 609 605	418 946 265
1982	39 163 981	2 969 035	71 110 422	113 234 438
Coal mines—				
1974	9 027 818	....	16 607 506	25 635 324
1975	3 300 000	....	59 000 000	62 300 000
1976	16 043 383	55 377	20 767 397	36 866 157
1977	30 466 894	....	25 943 377	56 410 271
1978	31 222 528	....	15 621 757	46 844 285
1979	46 473 678	628 021	40 698 097	87 799 796
1980	63 173 491	762 244	68 817 158	132 752 893
1981	6 092 432	18 779 550	247 123 358	271 995 340
1982	85 297 885	1 335 060	281 426 140	368 059 085
Others—				
1974	6 198 552	146 182	16 606 229	22 950 963
1975	17 350 175	124 860	18 077 384	35 552 419
1976	58 980	79 300	1 389 956	1 528 236
1977	432 731	108 500	931 521	1 472 752
1978	102 248	9 579	1 256 869	1 368 696
1979	187 044	30 700	1 033 645	1 251 389
1980	1 139 216	3 461	2 889 032	4 031 709
1981	702 587	....	1 272 328	1 974 915
1982	367 968	....	858 800	1 226 768
Totals—				
1974	36 159 871	1 868 862	79 946 061	117 974 794
1975	29 663 550	5 929 784	101 625 986	137 219 320
1976	23 039 592	538 903	64 038 479	87 616 974
1977	45 391 003	1 830 979	72 733 904	119 955 886
1978	41 749 648	584 743	34 787 442	77 121 833
1979	74 055 768	3 330 732	109 563 123	186 949 623
1980	97 691 722	3 307 327	322 432 256	423 431 305
1981	103 328 202	28 583 027	561 005 291	692 916 520
1982	124 829 834	4 304 095	353 386 362	482 520 291

Table 3-6—Production of Gold, Silver, Copper, Lead, Zinc, Molybdenum, and Iron Concentrates, 1858–1982

Year	Gold (Placer)		Gold (Fine)		Silver		Copper	
	Quantity	Value	Quantity	Value	Quantity	Value	Quantity	Value
	g	$	g	$	g	$	kg	$
1858–1890	100 978 533	55 192 163	...	...	6 876 531	214 152	...	...
1891–1900	11 703 748	6 397 183	19 682 165	12 858 353	700 977 829	13 561 194	16 064 375	4 365 210
1901–1910	15 787 261	8 628 660	72 224 836	47 998 179	971 114 910	16 973 507	172 344 737	56 384 783
1911–1920	8 656 275	4 731 100	63 112 995	41 942 862	994 340 920	22 572 682	231 326 501	100 770 459
1921	426 733	233 200	4 222 699	2 804 197	83 150 418	1 591 201	17 706 790	4 879 624
1922	674 624	368 800	6 153 915	4 089 684	220 872 076	4 554 781	14 678 125	4 329 754
1923	768 555	420 000	5 575 057	3 704 994	187 643 964	3 718 129	26 181 346	8 323 266
1924	769 799	420 750	7 704 711	5 120 535	259 454 010	5 292 184	29 413 222	8 442 870
1925	512 453	280 092	6 522 890	4 335 069	238 088 613	5 286 818	32 797 475	10 153 269
1926	650 426	355 503	6 264 984	4 163 859	334 312 337	6 675 606	40 523 625	12 324 421
1927	285 868	156 247	5 536 365	3 679 601	325 654 164	5 902 043	40 461 530	11 525 011
1928	262 012	143 208	5 619 130	3 734 609	330 536 775	6 182 461	44 410 233	14 265 242
1929	217 192	118 711	4 516 871	3 002 020	309 791 230	5 278 194	46 626 180	18 612 850
1930	278 527	152 235	5 002 482	3 324 975	352 342 964	4 322 185	41 894 588	11 990 466
1931	534 225	291 992	4 545 175	3 020 837	234 837 945	2 254 979	29 090 879	5 365 690
1932	634 501	395 542	5 649 891	4 263 389	222 406 822	2 264 729	22 955 299	3 228 892
1933	744 233	562 787	6 954 289	6 394 645	218 397 615	2 656 526	19 572 164	3 216 701
1934	783 205	714 431	9 244 309	10 253 952	267 920 527	4 088 280	22 521 530	3 683 662
1035	961 985	895 058	11 363 263	12 856 419	288 323 068	6 005 996	17 884 241	3 073 428
1936	1 349 528	1 249 940	12 583 590	14 172 367	296 944 198	4 308 330	9 830 071	2 053 828
1937	1 684 321	1 558 245	14 331 671	16 122 767	351 630 830	5 073 962	20 891 260	6 023 411
1938	1 796 478	1 671 015	17 340 607	19 613 624	337 827 661	4 722 288	29 832 572	6 558 575
1939	1 547 250	1 478 492	18 267 912	21 226 957	336 577 786	4 381 365	33 227 590	7 392 862
1940	1 215 101	1 236 928	18 149 347	22 461 516	383 436 042	4 715 315	35 371 049	7 865 085
1941	1 361 534	1 385 962	17 760 622	21 984 501	378 700 797	4 658 545	30 134 516	6 700 693
1942	1 023 413	1 041 772	13 825 843	17 113 943	301 011 133	4 080 775	22 723 823	5 052 856
1943	454 104	462 270	6 979 607	8 639 516	265 193 820	3 858 496	19 190 263	4 971 132
1944	355 601	361 977	5 804 815	7 185 332	177 453 003	2 453 293	16 465 584	4 356 070
1945	391 556	398 591	5 454 626	6 751 860	191 510 720	2 893 934	11 726 375	3 244 472
1946	489 219	475 361	3 658 086	4 322 241	197 994 264	5 324 959	7 938 069	2 240 070
1947	216 757	200 585	7 566 800	8 514 870	177 550 262	4 110 092	18 952 769	8 519 741
1948	632 386	585 200	8 902 612	10 018 050	209 016 328	5 040 101	19 515 886	9 616 174
1949	556 308	529 524	8 969 981	10 382 256	237 559 178	5 671 082	24 882 500	10 956 550
1950	595 125	598 717	8 832 723	10 805 553	295 772 610	7 667 950	19 147 001	9 889 458
1951	736 861	717 911	8 126 405	9 627 947	255 632 882	7 770 983	19 617 612	11 980 155
1952	545 982	494 756	7 955 805	8 765 889	274 042 530	7 326 803	19 053 280	13 054 893
1953	443 062	403 230	7 886 228	8 727 294	260 606 407	7 019 272	22 235 441	14 869 544
1954	270 098	238 967	8 036 642	8 803 279	305 630 613	8 154 145	22 747 578	14 599 693
1955	238 436	217 614	7 541 762	8 370 306	245 811 643	6 942 995	20 065 928	16 932 549
1956	120 213	109 450	5 963 782	6 603 628	261 423 017	7 511 866	19 667 923	17 251 872
1957	91 318	80 990	6 948 504	7 495 170	252 847 111	7 077 166	14 237 029	8 170 465
1958	175 732	157 871	6 044 992	6 604 149	218 998 027	6 086 854	5 741 837	2 964 529
1959	235 450	208 973	5 385 360	5 812 511	192 779 535	5 421 417	7 363 374	4 497 991
1960	119 653	107 418	6 394 155	6 979 441	231 612 937	6 600 183	14 997 694	9 583 724
1961	106 248	99 884	4 970 913	5 667 253	229 353 429	6 909 140	14 375 361	8 965 149
1962	103 106	96 697	4 940 712	5 942 101	192 521 474	7 181 907	49 431 850	33 209 215
1963	143 696	135 411	4 820 312	5 850 458	199 764 616	8 861 050	53 635 704	36 238 007
1964	57 292	55 191	4 307 361	5 227 884	163 901 675	7 348 938	52 414 456	38 609 136
1965	26 935	25 053	3 642 908	4 419 089	154 646 729	6 929 793	38 644 540	32 696 081
1966	47 743	44 632	3 717 057	4 506 646	172 594 622	7 729 939	47 990 080	56 438 255
1967	27 713	25 632	3 923 861	4 763 688	192 239 525	10 328 695	78 352 932	88 135 172
1968	20 839	19 571	3 853 537	4 672 242	221 791 325	16 475 795	73 024 968	87 284 148
1969	12 410	11 720	3 654 012	4 427 506	179 169 889	11 100 491	75 937 956	111 592 416
1970	15 272	14 185	3 135 462	3 685 476	202 521 462	12 041 181	96 329 694	124 657 958
1971	5 505	4 647	2 668 046	3 031 844	238 670 301	11 968 046	127 286 040	131 037 918
1972	21 492	26 905	3 782 871	6 995 448	215 420 498	11 519 660	211 832 288	209 403 822
1973	119 156	311 524	5 784 723	18 117 268	236 987 318	19 552 997	317 603 055	582 803 251
1974	45 162	232 512	5 001 082	26 749 083	181 695 950	28 440 365	287 547 048	541 644 913
1975	43 744	232 204	4 819 241	25 082 494	196 305 885	30 545 947	258 497 599	331 693 850
1976	26 064	115 613	5 393 477	21 761 502	239 720 882	32 532 836	263 618 197	378 984 941
1977	46 170	289 075	5 906 336	31 301 931	241 503 007	37 934 098	275 224 115	384 736 661
1978	36 515	295 001	6 542 332	47 951 880	227 271 890	45 071 509	273 692 676	431 694 395
1979	214 106	2 649 918	8 062 810	101 481 156	214 117 518	94 700 656	272 163 001	656 359 923
1980	280 104	6 213 376	7 197 312	163 930 073	203 801 811	156 548 306	264 674 830	670 623 616
1981	291 705	4 540 289	7 468 769	131 542 422	403 754 797	152 420 716	290 088 241	611 282 050
1982	175 607	2 467 470	7 511 908	115 802 480	499 565 577	158 260 320	279 873 599	495 009 799
Totals	164 142 225	114 335 931	599 713 546	1 197 563 070	18 191 926 232	1 132 670 203	5 054 248 094	6 537 382 666

Table 3-6—Production of Gold, Silver, Copper, Lead, Zinc, Molybdenum, and Iron Concentrates, 1858–1982—Continued

Year	Lead		Zinc		Molybdenum		Iron Concentrates	
	Quantity	Value	Quantity	Value	Quantity	Value	Quantity	Value
	kg	$	kg	$	kg	$	t	$
1858–1890	473 729	45 527	...	...	...	...	27 097	70 879
1891–1900	93 002 804	7 581 619	...	...	...	...	11 820	45 602
1901–1910	184 989 089	17 033 102	5 753 423	894 169	...	...	17 738	68 436
1911–1920	191 859 042	21 991 616	118 086 182	19 303 993	11 946	36 698	3 358	18 510
1921	18 779 664	1 693 354	22 416 133	1 952 065	...	...	916	5 050
1922	30 593 731	3 480 306	25 921 103	2 777 322	...	...	1 089	3 600
1923	43 845 439	6 321 770	26 464 465	3 278 903	...	...	220	1 337
1924	77 284 697	12 415 917	35 893 017	4 266 741	...	...	...	...
1925	107 908 698	18 670 329	44 568 438	7 754 450	...	...	...	...
1926	119 305 027	17 757 535	64 807 554	10 586 610	...	...	...	...
1927	128 364 347	14 874 292	65 872 809	8 996 135	...	...	...	...
1928	138 408 812	13 961 412	82 445 946	9 984 613	...	...	18	...
1929	139 705 336	15 555 189	78 061 406	9 268 792	...	...	...	...
1930	145 966 952	12 638 198	113 614 910	9 017 005	...	...	...	...
1931	118 796 232	7 097 812	91 657 703	5 160 911	...	...	...	...
1932	114 308 115	5 326 432	87 143 752	4 621 641	...	...	...	...
1933	123 235 512	6 497 719	88 887 198	6 291 416	...	...	...	...
1934	157 562 183	8 461 859	113 013 038	7 584 199	...	...	...	...
1935	156 156 723	10 785 930	116 227 650	7 940 860	...	...	...	...
1936	171 444 146	14 790 028	115 475 574	8 439 373	...	...	...	...
1937	190 107 902	21 417 049	132 081 905	14 274 245	...	...	...	...
1938	187 323 227	13 810 024	135 395 388	9 172 822	...	...	...	...
1939	171 794 338	12 002 390	126 283 585	8 544 375	...	...	...	...
1940	211 758 089	15 695 467	141 529 456	10 643 026	...	...	...	...
1941	207 218 262	15 358 976	166 861 962	12 548 031	...	...	...	...
1942	230 060 714	17 052 054	175 646 590	13 208 636	...	...	...	...
1943	199 196 604	16 485 902	152 474 485	13 446 018	...	...	...	...
1944	132 866 893	13 181 530	126 126 765	11 956 725	...	...	...	...
1945	152 849 156	16 848 823	133 714 538	18 984 581	...	...	...	...
1946	156 879 853	23 345 731	124 406 109	21 420 484	...	...	...	...
1947	142 306 192	42 887 313	114 761 068	28 412 593	...	...	...	...
1948	145 165 821	57 734 770	122 610 001	37 654 211	...	...	616	3 735
1949	120 373 215	41 929 866	130 736 145	38 181 214	...	...	4 964	27 579
1950	128 830 683	41 052 905	131 697 238	43 769 392	...	...	...	...
1951	124 037 181	50 316 015	153 091 761	67 164 754	...	...	102 997	790 000
1952	129 250 197	45 936 692	169 130 882	59 189 656	...	...	816 898	5 474 924
1953	135 004 129	39 481 244	173 407 848	40 810 618	...	...	899 240	6 763 105
1954	150 807 088	45 482 505	151 555 559	34 805 755	...	...	486 018	3 733 891
1955	137 241 656	45 161 245	194 680 177	52 048 909	...	...	554 223	3 228 756
1956	128 691 681	44 702 619	201 327 284	58 934 801	...	...	335 616	2 190 847
1957	127 732 462	39 568 086	203 787 462	50 206 681	...		324 174	2 200 637
1958	133 615 439	34 627 075	195 952 146	43 234 839	...	...	571 769	4 193 442
1959	130 372 360	33 542 306	182 498 693	44 169 198	...	...	770 421	6 363 848
1960	151 321 570	38 661 912	182 977 897	50 656 726	2 456	9 500	1 052 651	10 292 847
1961	174 307 617	42 313 569	175 970 780	45 370 891	...	...	1 211 147	12 082 540
1962	152 080 806	34 537 454	187 528 084	51 356 376	...	...	1 627 342	18 326 911
1963	142 869 197	37 834 714	182 734 698	53 069 163	...	...	1 869 009	20 746 424
1964	121 896 644	39 402 293	181 797 313	58 648 561	12 812	47 063	1 816 684	20 419 487
1965	113 480 794	43 149 171	141 179 547	48 666 933	3 306 274	12 405 344	1 964 410	21 498 581
1966	95 929 798	34 436 934	138 401 395	47 666 540	7 754 088	27 606 061	1 952 074	20 778 934
1967	94 406 546	31 432 079	119 217 472	39 248 539	7 945 782	31 183 064	1 954 468	20 820 765
1968	105 063 971	32 782 257	135 803 151	43 550 181	8 980 988	32 552 722	1 900 311	21 437 569
1969	95 286 815	33 693 539	134 565 199	46 639 024	12 064 350	47 999 442	1 882 266	19 787 845
1970	97 448 607	35 096 021	125 005 208	44 111 055	14 186 706	52 561 796	1 704 650	17 391 883
1971	112 865 575	34 711 408	138 549 629	49 745 789	9 926 694	36 954 846	1 750 738	18 153 612
1972	88 109 663	28 896 566	121 719 968	47 172 894	12 719 391	43 260 349	1 139 698	11 642 379
1973	84 890 924	30 477 936	137 380 768	62 564 751	13 785 264	51 851 509	1 420 160	12 906 063
1974	55 252 692	23 333 016	77 733 732	59 582 753	13 789 825	60 791 552	1 306 930	12 742 227
1975	70 603 483	24 450 158	99 668 230	80 572 872	13 026 627	71 201 391	1 305 840	15 273 878
1976	85 407 582	32 796 533	106 498 987	65 499 108	14 088 686	94 109 138	1 255 277	14 760 526
1977	78 172 646	42 316 293	103 780 228	61 301 001	15 521 970	142 057 947	445 317	7 362 345
1978	81 064 539	51 640 564	95 618 111	52 048 701	13 055 203	167 714 272	615 569	11 597 462
1979	84 451 905	88 100 363	88 418 642	61 890 891	10 766 497	321 228 104	668 026	13 008 475
1980	76 709 447	66 096 223	67 481 328	49 363 417	11 179 501	288 934 398	653 324	13 670 233
1981	84 854 093	61 529 276	79 214 552	67 026 535	12 933 224	198 240 391	602 272	14 274 498
1982	83 746 551	43 035 587	75 182 699	63 571 545	14 747 888	154 990 970	774 951	19 630 010
Totals	8 165 694 885	1 875 324 399	7 732 494 966	2 110 225 008	209 806 172	1 835 736 557	35 802 306	403 789 672

Table 3-7A—Mineral Production by Mining

Division	Period	Placer Gold		Metals	Industrial Minerals	Structural Materials
		Quantity	Value			
		g	$	$	$	$
Alberni	1981	....	....	35 031 245	....	1 022 903
	1982	....	....	**37 737 011**	....	**912 665**
	To Date	50 294	33 253	443 331 328	9 398	13 056 148
Atlin	1981	110 462	1 702 439	107 845	....	....
	1982	**63 422**	**698 894**	**1 717**	....	**12 500**
	To Date	23 258 113	22 026 334	38 285 812	20 325	503 069
Cariboo	1981	27 919	425 559	114 797 674	155 232	10 525 348
	1982	**26 825**	**427 076**	**79 242 144**	**6 850**	**8 179 935**
	To Date	81 364 000	56 115 626	933 344 202	1 336 277	96 213 012
Clinton	1981	68	1 306	....	....	1 221 542
	1982	**2 120**	**33 005**	**100**	....	**578 854**
	To Date	319 957	299 053	848 537	162 427	16 350 047
Fort Steele	1981	....	....	142 573 081	5 292 407	1 367 308
	1982	....	....	**105 468 723**	**4 444 686**	**1 628 117**
	To Date	639 241	472 087	3 353 171 160	44 595 925	21 608 416
Golden	1981	....	....	773 000	6 214 000	571 867
	1982	....	....	....	**6 408 706**	**756 431**
	To Date	16 403	51 639	67 075 470	50 282 630	7 423 724
Greenwood	1981	....	....	4 288 000	240 171	502 807
	1982	....	....	**3 921 009**	**185 123**	**407 937**
	To Date	159 178	132 270	265 154 256	2 955 230	6 317 921
Kamloops	1981	....	....	305 865 034	....	29 147 581
	1982	....	....	**274 696 658**	....	**24 968 817**
	To Date	883 329	1 021 423	2 359 956 855	6 542 538	181 755 068
Liard	1981	200	33 398	9 526 445	96 095 067	6 022 708
	1982	**318**	**5 047**	**13 024 457**	**73 457 544**	**5 114 496**
	To Date	1 598 833	1 879 492	60 731 213	817 956 923	50 638 473
Lillooet	1981	....	....	220 684	....	999 509
	1982	**1 330**	**17 519**	**64**	....	**1 050 384**
	To Date	2 895 325	1 965 519	148 503 081	473 095	7 431 567
Nanaimo	1981	....	....	161 681 207	100 448	12 676 744
	1982	....	....	**137 169 938**	**77 963**	**11 524 968**
	To Date	30 735	65 239	1 475 440 916	3 218 354	162 363 427
Nelson	1981	....	....	107 157	1 460 492	2 877 228
	1982	....	....	....	**1 183 893**	**792 055**
	To Date	111 535	89 026	409 715 211	13 628 745	23 149 829
New Westminster	1981	....	....	....	....	41 642 726
	1982	....	....	**4 057 505**	....	**27 191 275**
	To Date	975 418	597 152	67 826 478	1 611 625	421 352 131
Nicola	1981	....	....	21 118 849	....	584 125
	1982	....	....	**7 123 277**	....	**314 612**
	To Date	7 278	4 764	516 535 314	10 050	4 841 771
Omineca	1981	13 809	250 533	251 590 248	109 578	2 045 034
	1982	**18 165**	**281 425**	**199 764 897**	**70 000**	**923 902**
	To Date	1 789 899	2 064 297	1 830 702 780	2 393 893	39 246 414
Osoyoos	1981	....	....	58 184 063	46 569	529 628
	1982	....	....	**51 903 509**	**31 796**	**272 214**
	To Date	9 472	47 402	751 037 706	6 913 679	9 452 674
Revelstoke	1981	1 256	22 557	51	....	1 135 929
	1982	**1 123**	**15 754**	**21**	....	**2 032 816**
	To Date	241 440	262 175	15 523 902	....	11 620 202
Similkameen	1981	311	3 500	60 731 851	....	19 355
	1982	....	....	**48 172 699**	....	**807 269**
	To Date	1 418 222	916 258	611 955 409	18 558	7 746 859
Skeena	1981	....	....	39 042 526	....	3 235 355
	1982	....	....	**62 833 666**	....	**2 484 309**
	To Date	143 447	108 951	826 748 309	1 240 215	56 679 054
Slocan	1981	....	....	7 383 817	....	551 366
	1982	....	....	**6 102 357**	....	**1 426 285**
	To Date	11 384	9 397	317 394 139	....	5 929 180
Trail Creek	1981	....	....	10 977	....	509 341
	1982	....	....	**23 350**	....	**360 654**
	To Date	26 469	24 260	91 152 625	....	8 848 762
Vancouver	1981	....	....	9 652 210	....	67 611 299
	1982	....	....	**4 981 592**	....	**60 014 599**
	To Date	6 026	9 723	360 594 374	7 066 964	489 715 636
Vernon	1981	....	....	20 658	....	2 984 517
	1982	....	....	....	....	**3 149 129**
	To Date	116 328	532 340	398 707	244 239	32 550 698
Victoria	1981	....	....	....	....	12 864 487
	1982	....	....	....	....	**8 175 340**
	To Date	19 533	15 680	24 812 286	190 811	432 132 333
Not Assigned	1981	137 680	2 100 997	19 435 624	12 750 878	137 772
	1982	**62 304**	**988 750**	**18 796 208**	**9 777 657**	**1 067 006**
	To Date	48 050 366	25 586 571	486 887 281	115 354 785	80 143 885
Totals	1981	291 705	4 540 289	1 242 142 246	122 464 842	200 786 479
	1982	**175 607**	**2 467 470**	**1 055 020 910**	**95 644 218**	**164 156 644**
	To Date	164 142 225	114 335 931	15 457 127 351	1 076 226 686	2 187 080 800

Divisions, 1981 and 1982, and Total to Date

Coal		Crude Oil and Condensates		Natural Gas Delivered to Pipeline		Butane and Propane		Division Totals
Quantity	Value	Quantity	Value	Quantity	Value	Quantity	Value	
t	$	m³	$	10³m³	$	m³	$	$
								36 054 148
								38 659 676
								456 440 127
								1 810 284
								713 111
								60 835 540
								125 903 813
								87 856 005
263	1 100							1 087 010 217
								1 222 848
								611 997
								17 660 564
11 666 057	553 212 329							702 445 125
10 645 467	**566 865 449**							**678 406 975**
159 092 023	4 001 256 020							7 421 103 608
								7 558 867
								7 165 137
								124 833 463
								5 030 978
								4 514 069
								274 559 677
								335 012 615
								299 665 475
13 687	59 765							2 549 335 649
75 070	998 350	2 188 770	252 687 843	8 062 681	616 795 096	148 753	15 033 145	997 192 052
		2 234 214	**356 995 398**	**7 188 561**	**542 664 470**	**158 226**	**13 242 687**	**1 004 584 099**
206 993	2 513 857	60 611 828	2 188 358 868	161 253 788	4 221 130 514	16 681 303	88 373 372	7 431 582 712
								1 220 193
								1 067 967
								158 373 262
								174 458 399
								148 772 869
67 425 673	301 144 744							1 942 232 680
								4 444 877
								1 975 948
								446 582 811
								41 642 726
								31 248 700
								491 387 386
								21 702 974
								7 437 889
2 657 660	11 080 836							532 472 735
11 494	60 613							254 056 006
275	**12 791**							**201 053 015**
469 121	3 530 356							1 877 937 740
								58 760 260
								52 207 519
1 018	5 008							767 456 469
								1 158 537
								2 048 636
								27 412 279
								60 754 706
								48 979 968
4 188 851	19 553 725							640 190 809
								42 277 881
								65 317 975
33	116							884 776 645
								7 935 183
								7 528 642
								323 332 716
								520 318
								384 004
								100 025 647
								77 263 509
								64 996 191
								857 386 697
								3 005 175
								3 149 129
								33 725 984
								12 864 487
								8 175 340
								457 151 110
								34 425 271
								30 629 621
								707 972 522
11 752 621	554 271 292	2 188 770	252 687 843	8 062 681	616 795 096	148 753	15 033 145	3 008 721 232
10 645 742	**566 878 240**	**2 234 314**	**356 995 398**	**7 188 561**	**542 664 470**	**158 226**	**13 242 687**	**2 797 070 037**
234 055 322	4 339 145 527	60 611 828	2 188 358 868	161 253 788	4 221 130 514	16 681 303	88 373 372	29 671 779 049

Table 3-7B—Production of Lode Gold, Silver, Copper, Lead and Zinc by Mining Divisions, 1981 and 1982, and Total to Date

Division	Period	Lode Gold		Silver		Copper		Lead		Zinc		Division Total
		Quantity	Value	Quantity	Value	Quantity	Value	Quantity	Value	Quantity	Value	
		g	$	g	$	kg	$	kg	$	kg	$	$
Alberni	1981	532 429	8 330 133	24 359 317	8 628 462	2 188 285	3 666 551	1 952 720	1 421 054	13 250 339	12 937 198	34 983 398
	1982	**611 090**	**8 693 012**	**29 830 007**	**8 629 269**	**2 424 042**	**3 725 349**	**2 177 863**	**1 194 662**	**15 190 177**	**15 461 602**	**37 703 894**
	To Date	17 463 818	66 022 414	379 300 466	73 526 794	56 480 814	77 847 078	26 997 952	15 084 923	254 006 426	157 213 211	389 694 420
Atlin	1981	229	3 685	236 460	89 675	173	260	14 522	10 805	3 945	3 392	107 817
	1982	...	...	**10 481**	**1 717**	...	...	...	...	...	...	**1 717**
	To Date	10 706 876	12 135 261	106 042 056	3 094 087	11 239 185	8 160 621	10 833 419	3 464 687	41 313 775	10 869 006	37 723 662
Cariboo	1981	247 177	4 130 658	4 980 806	2 275 795	42 554 665	91 902 271	...	...	...	...	98 308 724
	1982	**266 378**	**3 891 793**	**4 292 959**	**938 148**	**30 965 083**	**60 078 908**	...	...	...	...	**64 908 849**
	To Date	38 039 041	54 515 242	38 838 427	11 826 875	382 423 060	689 922 111	20 718	11 194	2 445	1 241	756 276 663
Clinton	1981	...	...	...	...	...	...	...	...	...	...	...
	1982	...	...	**315**	**108**	...	...	...	...	...	...	**108**
	To Date	727 499	827 328	982 833	14 397	26 103	5 905	88	7	...	...	847 637
Fort Steele	1981	...	...	104 997 686	40 581 052	...	...	78 978 563	56 963 852	52 847 971	42 572 603	140 117 507
	1982	...	...	**85 977 381**	**26 919 004**	...	...	**69 239 516**	**35 310 941**	**51 499 674**	**40 778 209**	**103 008 154**
	To Date	390 707	749 363	8 405 857 932	413 647 833	7 163 855	12 534 149	6 899 227 119	1 567 462 877	5 219 552 816	1 298 715 246	3 293 109 468
Golden	1981	210	3 000	1 583 000	479 000	2 608	4 000	271 962	169 000	161 957	117 000	772 000
	1982	...	...	...	...	...	...	...	...	...	...	...
	To Date	14 199	28 757	145 133 213	5 422 871	534 700	371 849	118 229 049	26 466 805	152 500 635	33 583 756	65 874 038
Greenwood	1981	8 708	162 580	11 259 241	3 902 843	30	56	138 349	106 820	134 301	114 395	4 286 694
	1982	**4 168**	**58 119**	**12 041 275**	**3 740 918**	**35**	**20**	**99 477**	**45 407**	**107 464**	**76 308**	**3 920 772**
	To Date	43 581 964	40 965 894	1 440 103 745	64 242 191	273 352 671	153 550 595	12 223 464	3 114 645	12 077 460	3 066 988	264 940 313
Kamloops	1981	1 152 943	21 401 265	26 912 273	9 795 740	105 302 957	219 762 493	...	...	...	...	250 959 498
	1982	**304 455**	**5 543 673**	**31 732 963**	**8 373 195**	**128 292 126**	**212 717 690**	**518**	**240**	**192**	**123**	**226 634 921**
	To Date	8 287 806	97 065 305	294 083 348	75 532 483	1 122 627 998	1 895 000 650	401 661	122 799	245 844	53 511	2 067 774 748
Liard	1981	519 895	9 526 336	313	109	...	...	...	...	...	...	9 526 445
	1982	**891 567**	**13 024 441**	**41**	**16**	...	...	...	...	...	...	**13 024 457**
	To Date	2 441 587	41 309 245	548 904	271 006	13 570 392	19 147 861	7 428	2 736	804	286	60 731 134
Lillooet	1981	12 395	218 945	3 826	1 583	...	...	58	39	137	117	220 684
	1982	...	...	**249**	**64**	...	...	...	...	...	...	**64**
	To Date	130 210 423	147 692 517	30 734 694	721 718	181	41	28 413	2 587	144	119	148 416 982
Nanaimo	1981	1 603 384	29 278 372	11 895 991	5 201 415	50 746 733	109 240 473	...	...	...	...	143 720 260
	1982	**1 352 379**	**21 703 422**	**12 182 454**	**4 345 295**	**51 534 219**	**96 995 770**	...	...	...	...	**123 044 487**
	To Date	23 692 993	167 505 806	165 304 410	35 817 784	584 056 972	1 007 062 862	...	...	...	...	1 210 386 452
Nelson	1981	6 317	103 111	9 244	3 010	80	120	1 005	665	292	251	107 157
	1982	...	...	...	...	...	...	...	...	...	...	...
	To Date	41 762 053	42 559 442	324 115 026	9 142 504	6 765 621	1 689 384	240 837 922	69 419 737	686 788 568	223 722 156	346 533 223
New Westminster	1981	...	...	...	...	...	...	...	...	...	...	...
	1982	**275 516**	**4 051 982**	**12 095**	**5 523**	...	...	...	...	...	...	**4 057 505**
	To Date	415 676	4 183 526	482 341	13 252	11 333 143	11 553 105	12 893	1 119	5 786	481	15 751 483
Nicola	1981	− 13 312	− 344 041	...	...	9 170 160	19 930 264	...	...	...	...	19 586 223
	1982	...	...	...	...	**2 907 623**	**5 544 089**	...	...	...	...	**5 544 089**
	To Date	343 376	396 641	8 605 983	140 939	391 826 751	503 810 678	1 017 092	91 649	147 156	11 135	504 451 042

Omineca	1981	1 908 334	32 653 195	174 584 518	65 293 111	36 993 915	77 887 156	35 945	23 774	39 083	31 358	175 888 594
	1982	**1 823 355**	**28 861 199**	**272 901 740**	**89 190 956**	**23 761 131**	**43 609 965**	**7 161**	**3 315**	**14 361**	**11 500**	**161 676 935**
	To Date	16 232 548	140 102 720	827 478 835	175 093 800	377 926 598	637 102 070	13 889 378	3 990 113	19 704 451	6 248 772	962 537 475
Osoyoos	1981	99 758	1 622 758	7 753 082	2 454 943	10 812 068	22 129 936	807	856	2 366	2 447	26 210 940
	1982	**163 933**	**2 310 359**	**5 845 925**	**1 757 755**	**10 286 606**	**18 470 333**	**170**	**87**	…	…	**22 538 534**
	To Date	53 777 248	64 714 186	226 983 035	34 616 726	170 188 019	271 640 524	305 902	102 095	202 376	79 989	371 153 520
Revelstoke	1981	…	…	132	51	…	…	…	…	…	…	51
	1982	…	…	**70**	**21**	…	…	…	…	…	…	**21**
	To Date	1 163 843	1 088 308	128 335 646	2 833 657	69 710	51 037	16 411 486	3 880 101	12 315 621	3 317 982	11 171 085
Similkameen	1981	719 081	12 833 471	3 272 303	1 304 842	22 259 089	46 593 538	…	…	…	…	60 731 851
	1982	**521 263**	**7 560 921**	**4 219 373**	**1 238 812**	**21 274 659**	**39 372 966**	…	…	…	…	**48 172 699**
	To Date	14 561 543	88 175 936	166 069 435	11 890 094	492 006 008	511 736 871	178 550	15 137	36 494	5 258	611 823 296
Skeena	1981	200 634	3 670 373	6 812 999	2 488 081	9 633 517	19 569 280	288	166	1 896	2 000	25 729 900
	1982	**1 160 029**	**17 463 343**	**6 184 755**	**1 994 038**	**8 088 375**	**14 085 466**	…	…	…	…	**33 542 847**
	To Date	79 580 401	93 840 984	2 302 988 706	68 092 506	532 290 987	433 843 837	27 255 173	5 470 143	7 859 388	2 573 360	603 820 830
Slocan	1981	4 575	74 988	12 221 051	5 036 250	…	…	1 263 752	1 246 600	682 011	1 006 638	7 364 476
	1982	**348**	**5 472**	**13 116 360**	**4 468 473**	**32**	**40**	**1 161 490**	**773 685**	**713 760**	**854 609**	**6 102 279**
	To Date	604 805	987 821	2 514 760 033	85 588 063	7 085	2 798	520 227 250	113 290 074	437 937 991	111 608 744	311 477 530
Trail Creek	1981	684	10 577	1 244	400	…	…	…	…	…	…	10 977
	1982	**1 555**	**23 350**	…	…	…	…	…	…	…	…	**23 250**
	To Date	92 887 166	63 675 344	117 186 744	2 532 404	55 592 776	18 245 404	175 629	61 660	198 043	87 750	84 602 562
Vancouver	1981	466 347	7 879 600	1 327 280	512 730	26 867	40 300	579 294	413 310	903 606	806 270	9 652 210
	1982	**234 346**	**4 010 550**	**983 585**	**318 005**	**16 567**	**18 600**	**360 198**	**216 100**	**566 742**	**418 337**	**4 981 592**
	To Date	20 562 781	66 166 414	198 394 849	10 061 076	507 113 531	243 157 095	13 158 882	5 157 827	114 013 095	34 845 886	359 388 298
Vernon	1981	179	3 144	51 495	16 556	…	…	892	590	428	368	20 658
	1982	…	…	…	…	…	…	…	…	…	…	…
	To Date	165 633	189 982	2 301 203	166 560	297	100	87 255	29 866	33 939	11 667	398 175
Victoria	1981	…	…	…	…	…	…	…	…	…	…	…
	1982	…	…	…	…	…	…	…	…	…	…	…
	To Date	1 375 157	1 236 720	29 478 396	654 567	29 775 654	22 581 791	95 298	19 848	1 618 731	283 923	24 776 849
Not Assigned	1981	− 1 198	− 19 728	11 492 536	4 355 068	397 094	555 352	1 615 936	1 171 745	11 186 220	9 432 498	15 494 935
	1982	**− 98 074**	**− 1 399 156**	**20 233 549**	**6 339 003**	**320 111**	**390 603**	**10 700 158**	**5 491 150**	**7 090 329**	**5 970 857**	**16 792 457**
	To Date	724 403	1 427 914	337 815 972	47 726 016	27 875 983	18 364 250	264 072 864	58 061 770	771 932 978	223 924 511	349 504 461
Total	1981	7 468 769	131 542 422	403 754 797	152 420 716	290 088 241	611 282 050	84 854 093	61 529 276	79 214 552	67 026 535	1 023 800 999
	1982	**7 511 908**	**115 802 4[illegible]0**	**499 565 577**	**158 260 320**	**279 873 599**	**495 009 799**	**83 746 551**	**43 035 587**	**75 182 699**	**63 571 545**	**875 679 731**
	To Date	599 713 546	1 197 563 070	18 191 926 232	1 132 670 203	5 054 248 094	6 537 382 666	8 165 694 885	1 875 324 399	7 732 494 966	2 110 225 008	12 853 165 346

Table 3-7C—Production of Miscellaneous Metals by Mining Divisions, 1981 and 1982, and Total to Date

Division	Period	Antimony		Bismuth		Cadmium		Chromite		Iron Concentrates		Manganese		Mercury	
		Quantity	Value	Quantity	Value	Quantity	Value	Quantity	Value	Quantity	Value	Quantity	Value	Quantity	Value
		kg	$	kg	$	kg	$	t	$	t	$	t	$	kg	$
Alberni	1981					13 600	47 847								
	1982					**15 948**	**33 117**								
	To Date					635 222	4 002 197			4 293 517	49 634 711				
Atlin	1981					8	28								
	1982														
	To Date					144 799	561 790								
Cariboo	1981														
	1982														
	To Date														
Clinton	1981														
	1982														
	To Date							114	900						
Fort Steele	1981									28 181	639 427				
	1982									**36 168**	**891 903**				
	To Date					1 542 022	10 064 486			1 453 673	17 804 886				
Golden	1981					492	1 000								
	1982														
	To Date	18 172	14 906			259 654	1 186 526								
Greenwood	1981					312	1 306								
	1982					**349**	**237**								
	To Date					38 276	182 548	608	31 395						
Kamloops	1981														
	1982														
	To Date					99	641			19 204	95 851			4 984	5 795
Liard	1981														
	1982														
	To Date														
Lillooet	1981														
	1982														
	To Date	6 108	4 321											4 187	41 304
Nanaimo	1981														
	1982														
	To Date									15 872 977	152 633 401				
Nelson	1981														
	1982														
	To Date					4 059 962	19 859 034								
New Westminster	1981														
	1982														
	To Date														
Nicola	1981									40 778	1 532 626				
	1982									**43 093**	**1 579 188**				
	To Date									471 651	12 084 272				

Omineca	1981														
	1982														
	To Date	53 697	21 882			135 245	628 342							6 085 216	49 171 164
Osoyoos	1981														
	1982														
	To Date											15			
Revelstoke	1981														
	1982														
	To Date	4 261	3 455			46 997	176 102								
Similkameen	1981														
	1982														
	To Date														
Skeena	1981									533 313	12 102 445				
	1982									**695 690**	**17 158 919**				
	To Date					64 360	316 764			13 690 785	171 154 626				
Slocan	1981					1 637	19 341								
	1982					**–19**	**78**								
	To Date	14 453	8 133			1 245 601	5 900 316					491	8 160		
Trail Creek	1981														
	1982														
	To Date					52	210			499	1 925				
Vancouver	1981														
	1982														
	To Date					257 261	1 206 076								
Vernon	1981														
	1982														
	To Date					86	532								
Victoria	1981														
	1982														
	To Date					3 175	10 929					1 058	24 508		
Not Assigned	1981	68 323	360 745	47 300	102 641	85 913	301 555								
	1982	**213 519**	**1 161 543**	**27 305**	**83 007**	**131 378**	**252 833**								
	To Date	27 580 565	30 126 069	3 393 166	16 495 306	12 630 848	45 529 259								
Totals	1981	68 323	360 745	47 300	102 641	101 962	371 077			602 272	14 274 498				
	1982	**213 519**	**1 161 543**	**27 305**	**83 007**	**147 656**	**286 265**			**774 951**	**19 630 010**				
	To Date	27 677 256	30 178 766	3 393 166	16 495 306	21 063 659	89 625 752	722	32 295	35 802 306	403 789 672	1 564	32 668	6 094 387	49 218 263

Table 3-7C—Production of Miscellaneous Metals by Mining Divisions, 1981 and 1982, and Total to Date—Continued

Division	Period	Molybdenum		Nickel		Palladium		Platinum		Tin		Tungsten (WO$_3$)		Other Value	Division Total
		Quantity	Value	Quantity	Value	Quantity	Value	Quantity	Value	Quantity	Value	Quantity	Value		
		kg	$	kg	$	kg	$	g	$	kg	$	kg	$	$	$
Alberni	1981														47 847
	1982														**33 117**
	To Date														53 636 908
Atlin	1981														28
	1982														
	To Date											132	360		562 150
Cariboo	1981	1 393 361	16 488 950												16 488 950
	1982	**1 225 750**	**14 333 295**												**14 333 295**
	To Date	18 465 192	177 043 156					1 883	2 952			12 564	21 431		177 067 539
Clinton	1981														
	1982														
	To Date														900
Fort Steele	1981									124 213	1 816 147				2 455 574
	1982									**115 261**	**1 568 666**				**2 460 569**
	To Date									9 752 040	32 104 136			88 184[1]	60 061 692
Golden	1981														1 000
	1982														
	To Date														1 201 432
Greenwood	1981														1 306
	1982														**237**
	To Date														213 943
Kamloops	1981	3 169 421	54 905 536												54 905 536
	1982	**4 131 225**	**46 947 387**									**104 730**	**1 114 350**		**48 061 737**
	To Date	22 280 398	290 965 470									104 730	1 114 350		292 182 107
Liard	1981														
	1982														
	To Date							62	79						79
Lillooet	1981														
	1982														
	To Date	666	2 440					93	113			14 675	37 921		86 099
Nanaimo	1981	1 266 788	17 960 947												17 960 947
	1982	**1 785 863**	**14 125 451**												**14 125 451**
	To Date	9 789 015	112 421 063												265 054 464
Nelson	1981														
	1982														
	To Date	6 819	18 378									8 056 095	43 304 576		63 181 988
New Westminster	1981														
	1982														
	To Date			23 337 783	51 698 754									376 241[2]	52 074 995
Nicola	1981														1 532 626
	1982														**1 579 188**
	To Date														12 084 272

Omineca	1981	3 420 413	75 701 654												75 701 654
	1982	**2 574 426**	**38 087 962**												**38 087 962**
	To Date	98 510 157	813 645 633					93	154			1 002 839	4 697 710	420[2]	868 165 305
Osoyoos	1981	3 134 312	31 973 123												31 973 123
	1982	**2 473 945**	**29 364 975**												**29 364 975**
	To Date	44 333 699	379 884 186												379 884 186
Revelstoke	1981														
	1982														
	To Date	1 190 713	4 167 573									3 531	5 687		4 352 817
Similkameen	1981														
	1982														
	To Date							40 246	132 113						132 113
Skeena	1981	548 929	1 210 181												13 312 626
	1982	**2 556 679**	**12 131 900**												**29 290 819**
	To Date	13 576 543	51 074 369									166	331	1 389[3]	222 927 479
Slocan	1981														19 341
	1982														**78**
	To Date														5 916 609
Trail Creek	1981														
	1982														
	To Date	1 652 970	6 514 289			23 296	30 462	1 649	3 177						6 550 063
Vancouver	1981														
	1982														
	To Date														1 206 076
Vernon	1981														
	1982														
	To Date														532
Victoria	1981														
	1982														
	To Date														35 437
Not Assigned	1981									26 128	381 991			2 793 757	3 940 689
	1982													**506 368**	**2 003 751**
	To Date							16	213	312 665	3 264 100			41 967 873	137 382 820
Totals	1981	12 933 224	198 240 391							150 341	2 198 138			2 793 757	218 341 247
	1982	**14 747 888**	**154 990 970**							**115 261**	**1 568 666**	**104 730**	**1 114 350**	**506 368**	**179 341 179**
	To Date	209 806 172	1 835 736 557	23 337 783	51 698 754	23 296	30 462	44 042	138 801	10 064 705	35 368 236	9 194 732	49 182 366	42 434 107	2 603 962 005

[1] Magnesium, page 81.

[2] Cobalt, page 75.

[3] Selenium, page 84.

Table 3-7D—Production of Industrial Minerals by

Division	Period	Asbestos		Barite[1]		Diatomite		Fluxes (Quartz and Limestone)		Granules (Quartz, Limestone, and Granite)	
		Quantity	Value	Quantity	Value	Quantity	Value	Quantity	Value	Quantity	Value
		t	$	t	$	t	$	t	$	t	$
Alberni	1981										
	1982										
	To Date										
Atlin	1981										
	1982										
	To Date										
Cariboo	1981					3 600	155 232				
	1982					**137**	**6 850**				
	To Date					33 889	1 192 797			44	168
Clinton	1981										
	1982										
	To Date										
Fort Steele	1981										
	1982										
	To Date					7	80				
Golden	1981							28 819	409 230		
	1982							**34 793**	**940 613**		
	To Date			398 388	4 489 227			66 702	1 364 608		
Greenwood	1981									4 330	240 171
	1982									**3 060**	**185 123**
	To Date							1 624 308	1 540 319	12 468	631 333
Kamloops	1981										
	1982										
	To Date									703	14 230
Liard	1981	90 914	76 770 285								
	1982	**76 084**	**57 032 422**								
	To Date	1 870 487	742 988 610								
Lillooet	1981										
	1982										
	To Date										
Nanaimo	1981							19 494	100 448		
	1982							**19 008**	**77 963**		
	To Date							1 108 893	2 441 205	31 506	777 149
Nelson	1981									22 493	1 460 492
	1982									**17 194**	**1 183 893**
	To Date							6 895	8 174	322 799	13 564 670
New Westminster	1981										
	1982										
	To Date									99 490	1 611 625
Nicola	1981										
	1982										
	To Date										
Omineca	1981									133	9 578
	1982										
	To Date									307	22 551
Osoyoos	1981									1 341	46 569
	1982									**708**	**31 796**
	To Date							728 113	3 699 031	198 110	2 882 177
Similkameen	1981										
	1982										
	To Date										
Skeena	1981										
	1982										
	To Date							545 232	1 050 722		
Vancouver	1981										
	1982										
	To Date									26 936	418 606
Vernon	1981										
	1982										
	To Date							2 926	49 298	7 210	190 963
Victoria	1981										
	1982										
	To Date							286	3 505	8 713	157 080
Not Assigned	1981										
	1982										
	To Date										
Totals	1981	90 914	76 770 285			3 600	155 232	48 313	509 678	28 297	1 756 810
	1982	**76 084**	**57 032 422**			**137**	**6 850**	**53 801**	**1 018 576**	**20 962**	**1 400 812**
	To Date	1 870 487	742 988 610	398 395	4 489 307	33 889	1 192 797	4 083 355	10 156 862	708 286	20 270 552

[1] From 1972, excludes production which is confidential.

Other: *See* notes on individual materials listed alphabetically on pages 73 to 87.

[2] Natro-alunite.

[3] Hydromagnesite.

[4] Volcanic ash.

[5] Magnesium sulphate.

[6] Sodium carbonate.

[7] Phosphate rock.

Mining Divisions, 1981 and 1982, and Total to Date

Gypsum and Gypsite		Jade		Mica		Sulphur		Other, Value	Division Total
Quantity	Value	Quantity	Value	Quantity	Value	Quantity	Value		
t	$	kg	$	t	$	t	$	$	$
								9 398[2]	9 398
								20 325[3]	20 325
									155 232
									6 850
				4 542 160	143 012			300[4]	1 336 277
792	6 236							156 191[3,5,6]	162 427
						88 487	5 292 407		5 292 407
						65 315	**4 444 686**		**4 444 686**
102 400	298 824					1 828 094	44 280 127	16 894[7]	44 595 925
684 924	5 804 770								6 214 000
415 458	**5 468 093**								**6 408 706**
8 852 792	44 427 519							1 276[8,9]	50 282 630
									240 171
									185 123
								783 578[10]	2 955 230
1 131 179	6 323 178			192 640	2 075			203 055[5,6]	6 542 538
		13 849	33 598			272 716	19 291 184		96 095 067
		42 394	**250 861**			**233 714**	**16 174 261**		**73 457 544**
		1 687 677	6 017 964			1 826 009	68 950 349		817 956 923
		253 391	467 966					5 129[9]	473 095
									100 448
									77 963
									3 218 354
									1 460 492
									1 183 893
								55 901[8]	13 628 745
									1 611 625
2 184	10 050								10 050
		45 359	100 000						109 578
		36 287	**70 000**						**70 000**
		784 735	2 359 882					11 460[11,12]	2 393 893
									46 569
									31 796
				720 664	25 938			306 533[5,10,11]	6 913 679
227	1 700							16 858[13]	18 558
				287 689	10 815	37 761	178 678		1 240 215
						623 773	6 550 969	97 389[8]	7 066 964
				72 801	3 978				244 239
								30 226[8,9]	190 811
						146 363	8 753 971	3 996 907	12 750 878
						124 863	**8 496 913**	**1 280 744**[8,14,15,16]	**9 777 657**
						6 051 250	100 619 948	14 734 837	115 354 785
684 924	5 804 770	59 208	133 598			507 566	33 337 562	3 996 907	122 464 842
415 458	**5 460 093**	**78 681**	**320 861**			**423 892**	**29 115 860**	**1 280 744**	**95 644 218**
10 089 574	51 067 507	2 725 803	8 845 812	5 815 954	185 818	10 366 858	220 580 071	16 449 350	1 076 226 686

[8] Iron oxide and ochre.

[9] Talc.

[10] Fluorspar.

[11] Arsenious oxide.

[12] Perlite.

[13] Bentonite.

[14] Pumice.

[15] Sodium Antimate.

[16] Sodium Sulphate.

Table 3-7E—Production of Structural Materials by Mining Divisions 1981 and 1982, and Total to Date

Division	Period	Cement	Lime and Limestone	Building Stone	Rubble, Riprap, and Crushed Rock	Sand and Gravel	Clay Products	Unclassified Materials	Division Total
		$	$	$	$	$	$	$	$
Alberni	1981	.....	.....	.....	.....	1 022 903	.....	.....	1 022 903
	1982	.....	.....	.....	.....	**922 665**	.....	.....	**922 665**
	To Date	.....	.....	.....	346 659	12 719 489	.....	.....	13 066 148
Atlin	1981	.....	.....	.....	.....	.....	.....	.....	.....
	1982	.....	.....	.....	.....	**12 500**	.....	.....	**12 500**
	To Date	.....	1 108	.....	102 453	399 508	.....	.....	503 069
Cariboo	1981	.....	646 764	.....	4 021 833	5 856 751	.....	.....	10 525 348
	1982	.....	**645 252**	.....	**3 494 338**	**4 040 345**	.....	.....	**8 179 935**
	To Date	.....	6 553 965	.....	27 338 083	61 988 507	322 457	.....	96 213 012
Clinton	1981	.....	.....	.....	3 856	1 217 686	.....	.....	1 221 542
	1982	.....	.....	.....	**16 608**	**562 276**	.....	.....	**578 884**
	To Date	.....	.....	.....	3 369 684	12 980 863	.....	.....	16 350 547
Fort Steele	1981	.....	.....	.....	1 753	1 365 555	.....	.....	1 367 308
	1982	.....	.....	.....	.....	**1 628 117**	.....	.....	**1 628 117**
	To Date	.....	43 873	71 941	3 037 064	18 439 620	15 918	.....	21 608 416
Golden	1981	.....	.....	.....	.....	571 867	.....	.....	571 867
	1982	.....	.....	.....	**511 055**	**245 376**	.....	.....	**756 431**
	To Date	.....	1 000	50 840	766 978	6 476 747	128 159	.....	7 423 724
Greenwood	1981	.....	32 288	.....	.....	470 519	.....	.....	502 807
	1982	.....	**10 000**	.....	.....	**397 937**	.....	.....	**407 937**
	To Date	.....	150 259	161 090	278 474	5 606 815	121 283	.....	6 317 921
Kamloops	1981	22 643 289	.....	.....	4 114 265	2 390 027	.....	.....	29 147 581
	1982	**17 244 234**	**5 418**	**19 672**	**4 968 668**	**2 730 825**	.....	.....	**24 968 817**
	To Date	117 713 492	30 485	39 472	28 409 930	35 489 310	72 379	.....	181 755 068
Liard	1981	.....	.....	.....	69 072	5 953 636	.....	.....	6 022 708
	1982	.....	.....	.....	**49 634**	**5 064 862**	.....	.....	**5 114 496**
	To Date	.....	.....	.....	4 761 544	45 876 929	.....	.....	50 638 473
Lillooet	1981	.....	442 477	.....	7 409	549 623	.....	.....	999 509
	1982	.....	**564 508**	.....	**4 446**	**481 430**	.....	.....	**1 050 384**
	To Date	.....	2 758 133	11 755	1 143 373	3 518 306	.....	.....	7 431 567
Nanaimo	1981	.....	6 509 426	.....	662 607	5 504 711	.....	.....	12 676 744
	1982	.....	**6 642 820**	.....	**1 017 094**	**3 865 054**	.....	.....	**11 524 968**
	To Date	.....	101 053 371	3 450 735	11 468 949	45 211 380	1 178 922	.....	162 363 427
Nelson	1981	.....	1 651 584	.....	3 480	1 222 164	.....	.....	2 877 228
	1982	.....	.....	.....	**336**	**791 719**	.....	.....	**792 055**
	To Date	.....	8 007 648	437 138	627 701	14 055 368	21 974	.....	23 149 829
New Westminster	1981	.....	101 569	.....	916 299	30 322 086	10 292 772	.....	41 642 726
	1982	.....	**152 139**	.....	**2 684 097**	**18 501 778**	**5 853 261**	.....	**27 191 275**
	To Date	.....	4 154 389	20 974	30 943 049	239 221 221	147 012 498	.....	421 352 131
Nicola	1981	.....	.....	.....	.....	584 125	.....	.....	584 125
	1982	.....	.....	.....	.....	**314 612**	.....	.....	**314 612**
	To Date	.....	.....	8 000	187 994	4 645 777	.....	.....	4 841 771
Omineca	1981	.....	2 314	.....	342 532	1 700 188	.....	.....	2 045 034
	1982	.....	**8 211**	.....	.....	**915 691**	.....	.....	**923 902**
	To Date	.....	62 242	701	13 917 687	25 260 510	5 274	.....	39 246 414
Osoyoos	1981	.....	.....	.....	.....	529 628	.....	.....	529 628
	1982	.....	.....	.....	.....	**272 214**	.....	.....	**272 214**
	To Date	.....	43 744	33 018	355 349	9 020 533	.....	.....	9 452 674
Revelstoke	1981	.....	.....	11 875	94 015	1 030 039	.....	.....	1 135 929
	1982	.....	.....	**4 875**	**25 435**	**2 002 551**	.....	.....	**2 032 861**
	To Date	.....	1 000	108 500	3 171 949	8 338 753	.....	.....	11 620 202
Similkameen	1981	.....	.....	.....	.....	19 355	.....	.....	19 355
	1982	.....	.....	.....	.....	**807 269**	.....	.....	**807 269**
	To Date	10 500	11 571	24 000	712 341	6 975 092	13 355	.....	7 746 859
Skeena	1981	.....	.....	.....	868 267	2 367 088	.....	.....	3 235 355
	1982	.....	.....	.....	**88 552**	**2 395 757**	.....	.....	**2 484 309**
	To Date	.....	1 661 362	144 000	16 326 621	38 533 822	13 249	.....	56 679 054
Slocan	1981	.....	.....	.....	.....	551 366	.....	.....	551 366
	1982	.....	**1 211 134**	.....	.....	**215 151**	.....	.....	**1 426 285**
	To Date	.....	1 212 134	115 143	157 323	4 444 580	.....	.....	5 929 180
Trail Creek	1981	.....	.....	.....	.....	509 341	.....	.....	509 341
	1982	.....	.....	.....	.....	**360 654**	.....	.....	**360 654**
	To Date	.....	32 500	85 520	381 393	8 349 349	.....	.....	8 848 762
Vancouver	1981	58 167 660	.....	.....	.....	9 443 639	.....	.....	67 611 299
	1982	**52 021 479**	**1 225 315**	.....	**3 509**	**6 764 296**	.....	.....	**60 014 599**
	To Date	360 639 983	1 266 200	4 012 560	8 685 305	114 022 996	1 088 592	.....	489 715 636
Vernon	1981	.....	.....	.....	.....	2 984 517	.....	.....	2 984 517
	1982	.....	.....	.....	**26 029**	**3 123 100**	.....	.....	**3 149 129**
	To Date	.....	351 416	141 367	429 678	31 466 983	161 254	.....	32 550 698
Victoria	1981	1 561 426	13 783	.....	.....	11 289 278	.....	.....	12 864 487
	1982	.....	**780**	.....	.....	**8 174 560**	.....	.....	**8 175 340**
	To Date	326 058 081	1 230 211	55	532 563	93 456 287	10 855 136	.....	432 132 333
Not Assigned	1981	.....	.....	.....	.....	137 772	.....	.....	137 772
	1982	.....	.....	.....	**8 846**	**1 058 160**	.....	.....	**1 067 006**
	To Date	.....	315 498	505 018	2 888 690	67 281 680	3 180 828	5 972 171	80 143 885
Totals	1981	82 372 375	9 400 205	11 875	11 105 388	87 603 864	10 292 772	.....	200 786 479
	1982	**69 265 713**	**10 465 577**	**24 547**	**12 898 647**	**65 648 899**	**5 853 261**	.....	**164 156 644**
	To Date	804 422 056	128 942 139	9 421 827	160 340 834	913 780 425	164 201 348	5 972 171	2 187 080 800

Table 3-8A—Production of Coal, 1836–1982

Year	Quantity[1]	Value	Year	Quantity[1]	Value
	t	$		t	$
1836–59	37 985	149 548	1921	2 422 455	12 836 013
1860	14 475	56 988	1922	2 473 692	12 880 060
1861	13 995	55 096	1923	2 391 998	12 678 548
1862	18 409	72 472	1924	1 839 619	9 911 935
1863	21 687	85 380	1925	2 305 337	12 168 905
1864	29 091	115 528	1926	2 182 760	11 650 180
1865	33 345	131 276	1927	2 316 408	12 269 135
1866	25 518	100 460	1928	2 431 794	12 633 510
1867	31 740	124 956	1929	2 154 607	11 256 260
1868	44 711	176 020	1930	1 809 364	9 435 650
1869	36 376	143 208	1931	1 601 600	7 684 155
1870	30 322	119 372	1932	1 464 759	6 523 644
1871	50 310	164 612	1933	1 249 347	5 375 171
1882	50 310	164 612	1934	1 297 306	5 725 133
1873	50 311	164 612	1935	1 159 721	5 048 864
1874	82 856	244 641	1936	1 226 780	5 722 502
1875	111 912	330 435	1937	1 312 003	6 139 920
1876	141 425	417 576	1938	1 259 626	5 565 069
1877	156 525	462 156	1939	1 416 184	6 280 956
1878	173 587	522 538	1940	1 507 758	7 088 265
1879	245 172	723 903	1941	1 673 516	7 660 000
1880	271 889	802 785	1942	1 810 731	8 237 172
1881	232 020	685 171	1943	1 682 591	7 742 030
1882	286 666	846 417	1944	1 752 626	8 217 966
1883	216 721	639 897	1945	1 381 654	6 454 360
1884	400 391	1 182 210	1946	1 305 516	6 732 470
1885	371 461	1 096 788	1947	1 538 895	8 680 440
1886	331 875	979 908	1948	1 455 552	9 765 395
1887	419 992	1 240 080	1949	1 470 782	10 549 924
1888	497 150	1 467 903	1950	1 427 907	10 119 303
1889	589 133	1 739 490	1951	1 427 513	10 169 617
1890	689 020	2 034 420	1952	1 272 150	9 729 739
1891	1 045 607	3 087 291	1953	1 255 662	9 528 279
1892	839 591	2 479 005	1954	1 186 849	9 154 544
1893	993 988	2 934 882	1955	1 209 157	8 986 501
1894	1 029 204	3 038 859	1956	1 285 664	9 346 518
1895	954 727	2 824 687	1957	984 886	7 340 339
1896	909 237	2 693 961	1958	722 490	5 937 860
1897	906 610	2 734 522	1959	625 964	5 472 064
1898	1 146 015	3 582 595	1960	715 455	5 242 223
1899	1 302 088	4 126 803	1961	833 827	6 802 134
1900	1 615 688	4 744 530	1962	748 731	6 133 986
1901	1 718 692	5 016 398	1963	771 594	6 237 997
1902	1 667 960	4 832 257	1964	826 737	6 327 678
1903	1 473 933	4 332 297	1965	862 513	6 713 590
1904	1 712 739	4 953 024	1966	771 848	6 196 219
1905	1 855 121	5 511 861	1967	824 436	6 045 341
1906	1 929 540	5 548 044	1968	870 180	7 588 989
1907	2 255 214	7 637 713	1969	773 226	6 817 155
1908	2 143 225	7 356 866	1970	2 398 635	19 559 669
1909	2 439 109	8 574 884	1971	4 141 496	45 801 936
1910	3 007 074	11 108 335	1972	5 466 846	66 030 210
1911	2 305 778	8 071 747	1973	6 924 733	87 976 105
1912	2 913 778	10 786 812	1974	7 757 440	154 593 643
1913	2 461 665	9 197 460	1975	8 924 816	317 111 744
1914	2 029 400	7 745 847	1976	7 537 695	298 683 679
1915	1 883 851	7 114 178	1977	8 424 181	328 846 883
1916	2 343 671	8 900 675	1978	9 463 920	381 895 241
1917	2 209 982	8 484 343	1979	10 570 370	439 280 152
1918	2 336 238	12 833 994	1980	10 823 530	461 492 857
1919	2 207 659	11 975 671	1981	11 752 621	554 271 292
1920	2 587 763	13 450 169	1982	10 645 742	566 878 240
			Totals	234 055 322	4 339 145 527

[1] Quantity from 1836 to 1909 is gross mine output and includes material lost in picking and washing. For 1910 and subsequent years the quantity is that sold and used.

Table 3-8B—Coal Production and Distribution

	Raw Coal Production			Clean Coal Production	Coal Used
	Surface	Underground	Total		Making Coke and Plant Use
Fort Steele Mining Division	t	t	t	t	t
B.C. Coal (Greenhills)					
Metallurgical	78 000	....	78 000	....	....
Thermal	594 900	....	594 900	347 500	....
B.C. Coal (Sparwood)					
Metallurgical	6 398 092	1 075 939	7 474 031	5 598 756	22 566
Thermal	10 704	....	10 704	6 819	....
Byron Creek Collieries Ltd.					
Thermal	1 225 214	....	1 225 214	1 029 908	....
Crows Nest Resources					
Thermal	1 391 925	....	1 391 925	795 297	....
Fording Coal Ltd.					
Metallurgical	6 262 640	....	6 262 640	3 793 987	....
Thermal	106 168	....	106 168	106 168	....
Total Fort Steele	16 067 643	1 075 939	17 143 582	11 678 435	22 566
Omineca Mining Division					
Bulkley Valley Coal Ltd.					
Thermal	275	....	275	275	8
Totals 1982					
Metallurgical	12 738 732	1 075 939	13 814 671	9 392 743	22 566
Per cent of 1982 totals	79	100	81	80	100
Thermal	3 329 186	....	3 329 186	2 285 967	8
Per cent of 1982 totals	21	....	19	20	....
Totals 1982	16 067 918	1 075 939	17 143 857	11 678 710	22 574

Table 3-8C—Raw and Clean Coal Produced

Year	Raw Coal Produced			Clean Coal Produced		
	Metallurgical	Thermal	Total	Metallurgical	Thermal	Total
	t	t	t	t	t	t
1973	9 806 384	77 287	9 883 671	6 992 044	58 866	7 050 910
1974	9 503 578	658 697	10 162 275	7 133 053	607 337	7 740 390
1975	12 160 856	777 937	12 938 793	8 872 438	766 733	9 579 802
1976	9 405 065	724 935	10 130 000	6 785 282	713 087	7 498 369
1977	10 564 568	993 022	11 557 590	7 793 920	786 729	8 580 649
1978	11 093 352	1 285 863	12 379 215	8 034 021	1 059 027	9 093 048
1979	13 412 935	1 214 796	14 627 731	9 676 908	906 742	10 583 650
1980	12 901 844	1 261 669	14 163 513	9 098 175	1 058 050	10 156 225
1981	14 547 742	941 878	15 489 620	10 897 614	844 912	11 742 526
1982	13 814 671	3 329 186	17 143 857	9 392 743	2 285 967	11 678 710

by Collieries and by Mining Division, 1982

Coal Sales							Total Coal Sold and Used		
Canada			United States	Japan	Others	Total Sales	Quantity	Total Value	Average Value
British Columbia	Other Provinces	Total							
t	t	t	t	t	t	t	t	$	$/t
....	....	....	....	....	....	....	....		
....	....	....	1 729	....	252 676	254 405	254 405		
319	....	319	....	3 487 805	1 466 693	4 954 817	4 977 383		
....	....	....	51	197	223 333	223 581	223 581		
43 149	637 921	681 070	35 334	274 779	49 260	1 040 443	1 040 443		
....	584	584	29 387	25 200	660 154	715 325	715 325		
....	9	9	....	2 834 505	587 777	3 422 291	3 422 291		
....	....	....	....	....	12 039	12 039	12 039		
43 468	638 514	681 982	66 501	6 622 486	3 251 932	10 622 901	10 645 467		
267	....	267	....	....	....	267	275		
319	9	328	....	6 322 310	2 054 470	8 377 108	8 399 674	487 004 686	57.98
....	....	....	....	95	63	79	79	86	....
43 416	638 505	681 921	66 501	300 176	1 197 462	2 246 060	2 246 068	79 873 554	35.56
100	100	100	100	5	37	21	21	14	....
43 735	638 514	682 249	66 501	6 662 486	3 251 932	10 623 168	10 645 742	566 878 240	53.25

and Coal Sold and Used, 1973–1982

Coal Sold and Used								
Metallurgical			Thermal			Totals		
Quantity	Value	Average Price Per t	Quantity	Value	Average Price Per t	Quantity	Value	Average Price Per t all Types of Coal
t	$	$	t	$	$	t	$	$
6 853 120	87 406 677	12.75	71 613	569 428	7.21	6 924 733	87 976 105	12.70
7 261 404	149 025 665	20.52	496 036	5 567 978	11.22	7 757 440	154 593 643	19.93
8 104 102	305 484 901	37.70	820 714	11 626 843	14.17	8 924 816	317 111 744	35.53
6 824 493	283 753 979	41.58	713 202	14 929 700	20.93	7 537 695	298 683 679	39.63
7 615 953	314 316 005	41.27	808 228	14 639 667	18.11	8 424 181	328 846 883	39.04
8 530 370	361 254 854	42.35	933 550	20 640 387	22.11	9 463 920	381 895 241	40.35
9 591 975	412 392 598	42.99	978 395	26 887 554	27.48	10 570 370	439 280 152	41.56
9 654 317	423 128 068	43.83	1 169 213	38 364 789	32.81	10 823 530	461 492 857	42.64
10 811 498	518 427 584	47.95	914 123	35 843 708	38.09	11 752 621	554 271 292	47.16
8 399 674	487 004 686	57.98	2 246 068	79 873 554	35.56	10 645 742	566 878 240	53.25

Table 3-8D—Destination of B.C. Coal*—1982

Destination	B.C. Coal (Greenhills)	B.C. Coal (Sparwood)		Byron Creek	Crows Nest	Fording Coal		Bulkley Valley	Total Sales		Grand Totals
	Thermal	Metallurgical	Thermal	Thermal	Thermal	Metallurgical	Thermal	Thermal	Metallurgical	Thermal	
	t	t	t	t	t	t	t	t	t	t	t
Canada—											
B.C.	...	319	...	43 149	...	...	...	267	319	43 416	43 735
Alberta	...	...	...	801	...	...	...	...	...	801	801
Manitoba	...	...	...	49 639	584	...	...	...	...	50 223	50 223
Ontario	...	...	...	587 481	...	...	...	...	...	587 481	587 481
Quebec	...	...	...	...	...	9	...	...	9	...	9
Total Canadian	...	319	...	681 070	584	9	...	267	328	681 921	682 249
Foreign—											
Chile	...	25 599	...	...	...	25 239	...	...	50 838	...	50 838
Denmark	111 322	...	218 678	...	...	...	...	...	...	330 000	330 000
Hong Kong	60 236	...	...	49 260	67 348	...	...	...	...	176 844	176 844
Japan	...	3 487 805	197	274 779	25 200	2 834 505	...	...	6 322 310	300 176	6 622 486
Korea	81 118	1 094 100	4 655	...	592 806	210 478	12 039	...	1 304 578	690 618	1 995 196
Mexico	...	32 537	...	...	...	...	...	...	32 537	...	32 537
Pakistan	...	146 704	...	...	...	...	...	...	146 704	...	146 704
Taiwan	...	167 753	...	...	...	352 060	...	...	519 813	...	519 813
U.S.A.	1 729	...	51	35 334	29 387	...	...	...	...	66 501	66 501
Total Foreign	254 405	4 954 498	223 581	359 373	714 741	3 422 282	12 039	...	8 376 780	1 564 139	9 940 919
Totals, all sales	254 405	4 954 817	223 581	1 040 443	715 325	3 422 291	12 039	267	8 377 108	2 246 060	10 623 168

* Excludes coal used at plants and for making coke.

Table 3-9—Principal Items of Expenditures for Operations of all Classes

Class	Salaries and Wages	Fuel and Electricity	Process Supplies
	$	$	$
Metal Mining	274 531 182	120 040 918	283 257 421
Exploration and Development	246 725 650	....	....
Coal	163 760 206	50 557 810	56 520 943
Petroleum and Natural Gas (Exploration and Development)	14 672 111	....	....
Industrial Minerals	18 612 046	9 186 712	8 579 124
Structural Materials Industry	19 802 313	15 691 616	16 182 504
Totals, 1982	738 103 508	195 477 056	364 539 992
1981	673 125 913	150 053 316	346 669 928
1980	449 970 343	110 011 602	267 065 783
1979	387 135 371	97 166 988	211 066 592
1978	335 136 110	84 785 125	189 133 090
1977	337 382 149	71 149 313	192 025 357
1976	277 736 828	59 220 204	170 075 616
1975	246 953 568	49 104 838	154 476 238
1974	272 945 078	42 381 258	140 002 685
1973	221 877 595	36 750 711	103 840 649
1972	199 351 449	31 115 621	77 092 955
1971	179 175 692	23 166 904	68 314 944
1970	172 958 282	19 116 672	59 846 370
1969	123 450 327	14 554 123	43 089 559
1968	113 459 219	13 818 326	38 760 203
1967	94 523 495	13 590 759	34 368 856
1966	93 409 528	12 283 477	28 120 179
1965	74 938 736	11 504 343	30 590 631
1964	63 624 559	10 205 861	27 629 953
1963	57 939 294	10 546 806	12 923 325
1962	55 522 171	9 505 559	14 024 799
1961	50 887 275	8 907 034	17 787 127
1960	52 694 818	7 834 728	21 496 912
1959	49 961 996	7 677 321	17 371 638
1958	48 933 560	8 080 989	15 053 036
1957	56 409 056	8 937 567	24 257 177
1956	57 266 026	9 762 777	22 036 839
1955	51 890 246	9 144 034	21 131 572
1954	48 702 746	7 128 669	19 654 724
1953	55 543 490	8 668 099	20 979 411
1952	62 256 631	8 557 845	27 024 500
1951	52 607 171	7 283 051	24 724 101
1950	42 738 035	6 775 998	17 500 663
1949	41 023 786	7 206 637	17 884 408
1948	38 813 506	6 139 470	11 532 121
1947	32 160 338	5 319 470	13 068 948
1946	26 190 200	5 427 458	8 367 705
1945	22 620 975	7 239 726	5 756 628
1944	23 131 874	5 788 671	6 138 084
1943	26 051 467	7 432 585	6 572 317
1942	26 913 160	7 066 109	6 863 398
1941	26 050 491	3 776 747	7 260 441
1940	23 391 330	3 474 721	6 962 162
1939	22 357 035	3 266 000	6 714 347
1938	22 765 711	3 396 106	6 544 500
1937	21 349 690	3 066 311	6 845 330
1936	17 887 619	2 724 144	4 434 501
1935	16 753 367	2 619 639	4 552 730

Note—This table has changed somewhat through the years, so that the items are not everywhere directly comparable. Prior to 1962, lode mining referred only to gold, silver, copper, lead, and zinc. Prior to 1964, some expenditures for fuel and electricity were included with process supplies. Process supplies (except fuel) were broadened in 1964 to include "process, operating maintenance and repair supplies . . . used in the mine/mill operations; that is explosives, chemicals, drill steel, bits, lubricants, electrical, etc. . . . not charged to Fixed Assets Account . . . provisions and supplies sold in any company-operated cafeteria or commissary." Exploration and development other than in the field of petroleum and natural gas is given, starting in 1966.

Table 3-10—Employment in the Mineral Industry, 1901–1982

Year	Placer	Metals					Coal Mines			Structural Materials		Industrial Materials	Exploration and Development	Petroleum and Natural Gas Exploration and Development	Total
		Mines		Concentrates	Smelters	Total	Under	Above[1]	Total	Quarries and Pits	Plants				
		Under	Above												
1901	....	2 736	1 212	....	....	3 948	3 041	933	3 974	....	....	....	....	....	7 922
1902	....	2 219	1 126	....	....	3 345	3 101	910	4 011	....	....	....	....	....	7 356
1903	....	1 662	1 088	....	....	2 750	3 137	1 127	4 264	....	....	....	....	....	7 014
1904	....	2 143	1 163	....	....	3 306	3 278	1 175	4 453	....	....	....	....	....	7 759
1905	....	2 470	1 240	....	....	3 710	3 127	1 280	4 407	....	....	....	....	....	8 117
1906	....	2 680	1 303	....	....	3 983	3 415	1 390	4 805	....	....	....	....	....	8 788
1907	....	2 704	1 239	....	....	3 943	2 862	907	3 769	....	....	....	....	....	7 712
1908	....	2 567	1 127	....	....	3 694	4 432	1 641	6 073	....	....	....	....	....	9 767
1909	....	2 184	1 070	....	....	3 254	4 713	1 705	6 418	....	....	....	....	....	9 672
1910	....	2 472	1 237	....	....	3 709	5 903	1 855	7 758	....	....	....	....	....	11 467
1911	....	2 435	1 159	....	....	3 594	5 212	1 661	6 873	....	....	....	....	....	10 467
1912	....	2 472	1 364	....	....	3 836	5 275	1 855	7 130	....	....	....	....	....	10 966
1913	....	2 773	1 505	....	....	4 278	4 950	1 721	6 671	....	....	....	....	....	10 949
1914	....	2 741	1 433	....	....	4 174	4 267	1 465	5 732	....	....	....	....	....	9 906
1915	....	2 709	1 435	....	....	4 144	3 708	1 283	4 991	....	....	....	....	....	9 135
1916	....	3 357	2 036	....	....	5 393	3 694	1 366	5 060	....	....	....	....	....	10 453
1917	....	3 290	2 198	....	....	5 488	3 760	1 410	5 170	....	....	....	....	....	10 658
1918	....	2 626	1 764	....	....	4 390	3 658	1 769	5 427	....	....	....	....	....	9 817
1919	....	2 513	1 746	....	....	4 259	4 145	1 821	5 966	....	....	....	....	....	10 225
1920	....	2 074	1 605	....	....	3 679	4 191	2 158	6 349	....	....	....	....	....	10 028
1921	....	1 355	975	....	....	2 330	4 722	2 163	6 885	....	....	....	....	....	9 215
1922	....	1 510	1 239	....	....	2 749	4 712	1 932	6 644	....	....	....	....	....	9 393
1923	....	2 102	1 516	....	....	3 618	4 342	1 807	6 149	....	....	....	....	....	9 767
1924	....	2 353	1 680	....	....	4 033	3 894	1 524	5 418	....	....	....	....	....	9 451
1925	....	2 298	2 840	....	....	5 138	3 828	1 615	5 443	....	....	....	....	....	10 581
1926	299	2 606	1 735	808	2 461	7 610	3 757	1 565	5 322	493	324	124	....	....	14 172
1927	415	2 671	1 916	854	2 842	8 283	3 646	1 579	5 225	647	138	122	....	....	14 830
1928	355	2 707	2 469	911	2 748	8 835	3 814	1 520	5 334	412	368	120	....	....	15 424
1929	341	2 926	2 052	966	2 948	8 892	3 675	1 353	5 028	492	544	268	....	....	15 565
1930	425	2 316	1 260	832	3 197	7 605	3 389	1 256	4 645	843	344	170	....	....	14 032
1931	688	1 463	834	581	3 157	6 035	2 957	1 125	4 082	460	526	380	....	....	12 171
1932	874	1 355	900	542	2 036	4 833	2 628	980	3 608	536	329	344	....	....	10 524
1933	1 134	1 786	1 335	531	2 436	6 088	2 241	853	3 094	376	269	408	....	....	11 369
1934	1 122	2 796	1 729	631	2 890	8 046	2 050	843	2 893	377	187	360	....	....	12 985
1935	1 291	2 740	1 497	907	2 771	7 915	2 145	826	2 971	536	270	754	....	....	13 737
1936	1 124	2 959	1 840	720	2 678	8 197	2 015	799	2 814	931	288	825	....	....	14 179
1937	1 371	3 603	1 818	1 168	3 027	9 616	2 286	867	3 153	724	327	938	....	....	16 129
1938	1 303	3 849	2 266	919	3 158	10 192	2 088	874	2 962	900	295	369	....	....	16 021
1939	1 252	3 905	2 050	996	3 187	10 138	2 167	809	2 976	652	311	561	....	....	15 890
1940	1 004	3 923	2 104	1 048	2 944	10 019	2 175	699	2 874	827	334	647	....	....	15 705
1941	939	3 901	1 823	1 025	3 072	9 821	2 229	494	2 723	766	413	422	....	....	15 084
1942	489	2 920	1 504	960	3 555	8 939	1 892	468	2 360	842	378	262	....	....	13 270
1943	212	2 394	1 699	891	2 835	7 819	2 240	611	2 851	673	326	567	....	....	12 448
1944	255	1 896	1 825	849	2 981	7 551	2 150	689	2 839	690	351	628	....	....	12 314
1945	209	1 933	1 750	822	2 834	7 339	1 927	503	2 430	921	335	586	....	....	11 820
1946	347	1 918	1 817	672	2 813	7 220	1 773	532	2 305	827	555	679	....	....	11 933
1947	360	3 024	2 238	960	3 461	9 683	1 694	731	2 425	977	585	869	....	....	14 899
1948	348	3 143	2 429	1 126	3 884	10 582	1 594	872	2 466	1 591	656	754	....	....	16 397
1949	303	3 034	2 724	1 203	3 763	10 724	1 761	545	2 306	2 120	542	626	....	....	16 621
1950	327	3 399	2 415	1 259	3 759	10 832	1 745	516	2 261	1 916	616	660	....	....	16 612
1951	205	3 785	3 695	1 307	4 044	12 831	1 462	463	1 925	1 783	628	491	....	....	17 863
1952	230	4 171	3 923	1 516	4 120	13 730	1 280	401	1 681	1 530	557	529	....	....	18 257
1953	132	3 145	2 589	1 371	3 901	11 006	1 154	396	1 550	1 909	559	634	....	....	15 790
1954	199	2 644	2 520	1 129	3 119	9 412	1 076	358	1 434	1 861	638	584	....	....	14 128
1955	103	2 564	2 553	1 091	3 304	9 512	1 100	378	1 478	1 646	641	722	....	....	14 102
1956	105	2 637	2 827	1 043	3 339	9 846	968	398	1 366	1 598	770	854	....	....	14 539
1957	67	2 393	2 447	838	3 328	9 006	1 020	360	1 380	1 705	625	474	....	....	13 257
1958	75	1 919	1 809	625	3 081	7 434	826	260	1 086	1 483	677	446	....	....	11 201
1959	99	1 937	1 761	618	3 008	7 324	765	291	1 056	1 357	484	459	....	....	10 779
1960	86	1 782	1 959	648	3 034	7 423	894	288	1 182	1 704	557	589	....	....	11 541
1961	74	1 785	1 582	626	3 118	7 111	705	237	942	1 828	508	571	....	....	11 034
1962	35	1 677	1 976	949	3 356	7 958	548	228	776	1 523	481	517	270	....	11 560
1963	43	1 713	2 012	850	3 239	7 814	501	247	748	909	460	528	450	....	10 952
1964	5	1 839	1 967	822	3 281	7 909	446	267	713	1 293	444	509	772	....	11 645
1965	2	1 752	2 019	965	3 529	8 265	405	244	649	1 079	422	639	786	441	12 283
1966	2	2 006	2 296	1 014	3 654	8 970	347	267	614	1 269	393	582	1 894	478	14 202
1967	....	1 928	2 532	992	3 435	8 887	260	197	457	1 309	372	584	1 264	507	13 380
1968	....	1 823	2 369	1 072	3 283	8 547	195	358	553	1 207	380	582	3 990	400	15 659
1969	7	1 794	2 470	1 099	3 468	8 831	245	455	700	1 097	549	567	4 270	416	16 437
1970	....	2 160	3 167	1 331	3 738	10 396	242	1 033	1 275	740	647	627	4 964	437	19 086
1971	....	2 073	3 058	1 513	3 481	10 125	444	1 013	1 457	846	794	666	4 040	495	18 423
1972	....	1 833	3 463	1 734	3 353	10 383	214	1 771	1 985	1 116	800	527	4 201	458	19 470
1973	....	1 704	4 005	2 394	3 390	11 493	265	1 951	2 216	898	802	667	3 392	454	19 922
1974	....	1 509	4 239	2 352	2 767	10 867	267	2 255	2 522	895	782	646	2 848	509	19 069
1975	....	1 100	3 619	1 983	3 733	10 435	299	2 464	2 763	826	725	705	2 931	518	18 903
1976	....	1 268	3 733	2 048	3 542	10 591	327	2 300	2 627	931	680	670	3 101	495	19 095
1977	....	1 208	3 768	2 224	3 590	10 790	312	2 556	2 868	1 380	626	766	3 537	490	20 457
1978	....	1 009	3 874	2 029	3 838	10 750	377	2 606	2 983	734	460	618	3 232	496	19 273
1979	....	898	3 615	2 084	4 273	10 870	413	2 931	3 344	931	601	726	3 707	489	20 668
1980	....	1 012	4 173	2 463	4 800	12 448	354	3 258	3 612	473	940	728	5 800	362	24 363
1981	....	1 280	5 292	2 986	4 843	14 401	343	3 277	3 620	131	562	678	7 201	298	26 891
1982	....	**1 318**	**4 722**	**2 366**	**4 177**	**12 583**	**347**	**4 385**	**4 652**	**131**	**442**	**554**	**6 651**	**437**	**25 450**

[1] Commencing with 1967, does not include employment in by-product plants.

NOTE—These figures refer only to company employees and do not include the many employees of contracting firms.

Table 3-11—Employment at Major Metal and Coal Mines, 1982

	Tonnes		Days Operating Mill	Average Number Employed[1]					
					Mine				
	Mined	Milled		Administrative	Surface	Underground	Mill	Others	Total
Metal Mines									
Afton Mines Ltd. (Afton)	746 266	655 464	97	45	63	......	31	......	139
Amax of Canada Ltd. (Kitsault)	2 228 831	2 228 831	200	107	188	......	101	37	433
Bethlehem Copper Corp. (Bethlehem)	3 165 342	3 112 829	181	70	121	......	97	......	288
Brenda Mines Ltd. (Brenda)	9 790 600	9 484 562	323	112	162	......	170	......	444
Canada Wide Mines Ltd. (Granduc)	500 335	510 235	361	83	......	215	36	100	434
Carolin Mines Ltd. (Carolin)	262 057	262 057	278	13	......	45	33	18	109
Cominco Ltd. (Sullivan)	2 195 384	2 446 247	325	208	155	585	255	......	1 203
Craigmont Mines Ltd. (Craigmont)	842 623	861 430	334	20	37	9	13	1	80
Dankoe Mines Ltd. (Horn Silver)	......	2 918	32	2	......	......	4	......	6
David Minerals Ltd. (Utica)	3 720	5 383	200	2	1	2	8	......	13
Dickenson Mines Ltd. (Silvana)	27 555	26 196	285	4	8	23	15	......	50
Dupont of Canada Exploration Ltd. (Baker)	26 618	31 030	357	12	......	9	24	......	45
Equity Silver Mines Ltd. (Equity Silver)	1 876 029	1 939 546	365	46	156	......	116	......	318
Erickson Gold Mining Corp. (Erickson)	38 724	38 724	352	9	3	26	10	26	74
Falconbridge Nickel Mines Ltd. (Tasu)	1 108 162	1 108 162	343	41	......	39	79	......	159
Gibraltar Mines Ltd. (Gibraltar)	9 210 500	13 378 760	361	121	90	......	262	......	473
Good Hope Resources Ltd. (Good Hope)	6 874	......	....	2	......	2	......	......	4
Grove Exploration Ltd. (French)	1 044	......	...	1	......	1	......	......	2
Highmont Mining Corp. (Highmont)	9 136 164	8 905 999	364	50	133	......	84	166	433
Lornex Mining Corp. Ltd. (Lornex)	27 829 432	27 842 904	365	112	546	......	341	5	1 004
Mosquito Creek Gold Mining Co. (Mosquito Creek)	21 342	22 508	252	5	2	25	23	......	55
Newmont Mines Ltd. (Similkameen)	6 911 841	6 704 021	365	73	132	......	96	......	301
Noranda Mines Ltd. (Bell)	3 353 856	3 374 530	239	84	157	......	64	......	305
Noranda Mines Ltd. (Boss Mountain)	445 000	445 000	234	22	22	40	27	......	111
Noranda Mines Ltd. (Granisle)	1 822 625	1 880 953	176	35	52	......	33	26	146
Northair Mines Ltd. (Warman)	31 493	27 187	146	8	8	24	7	......	47
Placer Development Ltd. (Endako)	2 847 000	2 948 000	153	107	68	......	172	......	347
Reako Explorations Ltd. (Free Gold)	4 717	4	60	3	1	......	2	......	6
Scottie Gold Mine Ltd. (Scottie)	44 288	49 072	365	19	9	37	28	11	104
Taurus Resources Ltd. (Taurus)	37 169	37 169	365	3	......	13	12	......	28
Teck Corp. Ltd. (Highland Bell)	36 235	36 235	355	8	6	19	9	......	42
Utah Mines Ltd. (Island Copper)	15 299 205	15 291 656	364	133	530	......	192	......	855
Wesmin Resources Ltd. (Lynx and Myra)	287 584	287 584	341	64	58	204	22	......	348
Total Metal Mines	......	......	....	1 624	2 708	1 318	2 366	390	8 406
Coal Mines	Raw Coal								
B.C. Coal Ltd. (Greenhills)	672 900	......	365	125	135	......	......	......	260
B.C. Coal Ltd. (Sparwood)	7 484 735	......	365	578	1 069	347	227	......	2 221
Byron Creek Collieries Ltd.	1 225 214	......	365	56	64	......	20	40	180
Crows Nest Resources Ltd.	1 391 925	......	365	146	155	......	128	......	429
Fording Coal Ltd.	6 368 808	......	365	165	1 327	......	70	......	1 562
Total Coal Mines	......	......	....	1 070	2 750	347	445	40	4 652

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[1] The average number of employed includes wage-earners and salaried employees. The average is obtained by adding the monthly figures and dividing by 12, irrespective of the number of months worked.

Table 3-12—Metal Production, 1982

Property of Mine (and Location of Mine)	Owner or Agent	Ore Shipped or Treated	Product Shipped	Gross Metal Content					
				Gold	Silver	Copper	Lead	Zinc	Cadmium
Alberni Mining Division		t		g	g	kg	kg	kg	kg
Lynx and Myra (Buttle Lake)	Westmin Resources Ltd.	287 584	Copper concentrates, 9 078 t; lead concentrates, 5 576 t; zinc concentrates, 32 944 t.	656 781	33 364 451	2 677 011	2 409 516	17 923 645	75 528
Atlin Mining Division									
Nil	...	...	...	...	...	...	...	...	...
Cariboo Mining Division									
Boss Mountain (Tokomkane Mountain)	Noranda Mines Ltd. (Boss Mountain Division)	445 000	Molybdenite concentrates, 955 t[1] containing 539 355 kg of molybdenum.	...	...	...	...	...	...
Gibraltar (McLeese Lake)	Gibraltar Mines Ltd.	13 378 760	Copper concentrates, 127 790 t[1]; molybdic oxide, 1 265 t, containing 686 395 kg of molybdenum.	...	4 281 954	32 279 933	...	...	...
Mosquito Creek (Wells)	Mosquito Creek Gold Mining Co. Ltd.	22 508	Gold bullion	260 978	75 215	...	...	...	...
Clinton Mining Division									
Nil	...	...	...	...	...	...	...	...	...
Fort Steele Mining Division									
Sullivan (Kimberley)	Cominco Ltd.	2 446 247	Lead concentrates, 115 369 t; zinc concentrates, 117 384 t; tin concentrates, 316 t containing 119 975 kg of tin.	...	95 864 617	...	76 006 790	63 634 613	...
Golden Mining Division									
Nil	...	...	...	...	...	...	...	...	...
Greenwood Mining Division									
(Boundary Falls) Skomac (Greenwood)	Robert Mines Ltd.	34	Crude ore	311	24 976	...	2 096	1 082	...
Highland Bell (Beaverdell)	Teck Corporation	36 235	Lead concentrates, 331 t; zinc concentrates, 252 t; gold-silver concentrates, 509 t.	4 634	12 922 904	278	111 629	145 206	794
Kamloops Mining Division									
Afton (Kamloops)	Afton Mines Ltd.	655 464	Blister copper, 3 903 t	240 243	1 780 643	3 869 000	...	...	...
Bethlehem (Highland Valley)	Bethlehem Copper Corp.	3 112 829	Copper concentrates, 37 244 t	76 732	4 251 939	15 281 276	...	...	...
Highmont (Highland Valley)	Highmont Mining Corp.	8 905 999	Copper concentrates, 32 615 t; molybdenite concentrates, 3 505 t containing 2 021 988 kg of molybdenum.	...	...	10 267 974	...	...	...
Lornex (Highland Valley)	Lornex Mining Corp. Ltd.	27 842 904	Copper concentrates, 362 330 t; molybdenite concentrates, 1 386 t; molybdic oxide, 2 612 t; ferro-molybdenum, 20 t all containing 2 109 237 kg of molybdenum.	...	28 849 936	102 788 005	...	...	...
OK, Alwin (Highland Valley)	DeKalb Mining Corp.	—[2]	Copper concentrates, 809 t	5 112	301 000	311 955	...	...	...
Pop (Barriere)	K. Bauer, Kamloops	6	Crude ore	...	22 768	...	582	333	...
Silence Lake (Clearwater)	Dimac Resources Corp.	105	Tungsten concentrate	...	...	...	...	...	...
Liard Mining Division									
Erickson (McDame Lake)	Erickson Gold Mining Corp.	38 724	Gold concentrates, 825 t	655 786	...	...	...	...	...
Taurus (Cassiar)	Taurus Resources Ltd.	37 169	Gold concentrates, 1 150 t	251 119	...	...	...	...	...
Lillooet Mining Division									
Nil	...	...	...	...	...	...	...	...	...
Nanaimo Mining Division									
Island Copper (Rupert Inlet)	Utah Mines Ltd.	15 291 656	Copper concentrates, 235 590 t; molybdenite concentrates, 4 013 t containing 1 785 863 kg of molybdenum.	1 395 613	13 537 073	53 890 102	...	...	...

Nelson Mining Division									
Nil									
New Westminster Mining Division									
Carolin (Hope)	Carolin Mines Ltd.	262 057	Gold bullion; crude ore, 12 t	275 806	12 493				
Nicola Mining Division									
Craigmont (Merritt)	Craigmont Mines Ltd.	690 029	Copper concentrates, 11 411 t; iron concentrates, 43 093 t.			3 018 203			
Omineca Mining Division									
Baker, Chapelle (Black Lake)	DuPont of Canada Exploration Ltd.	31 030	Gold bullion	528 532	11 234 669				
Bell, Newman (Babine Lake)	Noranda Mines Ltd. (Babine Division–Bell Mine)	3 374 530	Copper concentrates, 39 656 t	376 134	2 039 424	10 849 825			
Endako (Endako)	Placer Development Ltd. (Endako Mine Division)	2 948 000	Molybdenite concentrates, 107 t; molybdic oxide, 4 037 t; ferro-molybdenum, 134 t; containing 2 574 426 kg of molybdenum.						
Equity Silver (Houston)	Equity Silver Mines Ltd.	1 939 546	Copper-silver-gold concentrates, 42 995 t.	959 106	274 986 398	7 633 814			
Free Gold (Dome Mountain)	Reako Explorations Ltd.	4 717	Gold concentrates, 49 t; crude ore, 13 t	7 572	13 424		1 204	6 114	
Granisle (Babine Lake)	Noranda Mines Ltd. (Babine Division-Granisle Mine)	1 880 953	Copper concentrates, 22 353 t	135 570	1 707 084	6 433 439			
Robin (Smithers)	W. F. McIntosh, Smithers	17	Crude ore	156	85 286		3 597	2 724	
Silver Standard (Hazelton)	P. Kindrat, Smithers and G. Braun, Hazelton	571	Crude ore	2 146	1 105 418		41 039	45 334	76
Osoyoos Mining Division									
Brenda (Brenda Lake)	Brenda Mines Ltd.	9 484 562	Copper concentrates, 37 225 t; molybdenite concentrates, 4 408 t containing 2 473 945 kg of molybdenum	91 457	5 783 839	10 690 976			
French (Nickel Plate Mountain)	Grove Exploration Ltd.	1 044	Gold-silver concentrates, 18 t	2 790	18 600	2 900			
Good Hope (Nickel Plate Mountain)	Good Hope Resources Ltd.	6 874	Gold-silver concentrates, 124 t	77 410	119 539	602			
Horn Silver (Keremeos)	Dankoe Mines Ltd.	2 918	Gold-silver concentrates, 108 t	7 816	551 962	325	1 225		
Revelstoke Mining Division									
Nil									
Similkameen Mining Division									
Similkameen, Ingerbelle (Princeton)	Newmont Mines Ltd. (Similkameen Div.)	6 704 021	Copper concentrates, 74 861 t	623 563	5 383 576	22 098 129			
Skeena Mining Division									
Granduc (Stewart)	Canada Wide Mines Ltd.	500 335	Copper concentrates, 18 900 t	52 627	3 606 800	5 380 913			
Kitsault (Alice Arm)	Amax of Canada Ltd.	2 228 831	Molybdenite concentrates, 4 691 t containing 2 556 679 kg of molybdenum						
Scottie, Summit Lake (Stewart)	Scottie Gold Mines Ltd.	49 072	Gold bullion	1 048 840	546 667				
Tasu (Tasu Sound)	Falconbridge Nickel Mines Ltd. (Wesfrob Mines Division)	1 108 162	Iron concentrates, 695 690 t; copper concentrates, 13 407 t.	67 184	2 538 293	3 029 558			
Slocan Mining Division									
Bluebell (Riondel)	Inland Recovery Ltd.	24	Tailings		22 674		7 204	955	
Bluebird (Kaslo)	George Sipos, Kaslo	5	Crude ore		27 091		3 649	259	
Hall (Sandon)	Hallmac Mines Ltd.	1 073	Crude ore		1 960 359		273 946		
Hecla (Silverton)	Mengler Leasing Co.	388	Zinc concentrates, 27 t		23 110		355	13 941	
Little Tim (Little Tim Creek)	M. Nabor, Slocan	216	Lead concentrates, 20 t	1	37 759	37	535	351	
Morning Star (Slocan)	Don Roy, Slocan	4	Crude ore	249	871		34 952	20 925	
Ottawa (Springer Creek)	C. Thickett, Slocan	28	Crude ore		358 125	137			

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[1] Estimated.

[2] Produced in 1981.

Table 3-12—Metal Production, 1982—Continued

Property of Mine (and Location of Mine)	Owner or Agent	Ore Shipped or Treated	Product Shipped	Gross Metal Content					
				Gold	Silver	Copper	Lead	Zinc	Cadmium
		t		g	g	kg	kg	kg	kg
Silmonac, Silvana, Minniehaha (Slocan Lake)	Dickenson Mines Ltd.	26 196	Lead concentrates, 1 625 t; zinc concentrates, 857 t.		9 735 699		868 502	654 701	50
Solo (Ainsworth)	J. Hawes, Ainsworth	21	Crude ore	93	1 431		186	62	
Utica (12 Mile Creek)	David Minerals Ltd.	5 383	Silver concentrates, 821 t (clean-up)		1 757 500		41 872	126 436	
Victor (Sandon)	E. H. Peterson, New Denver	15	Crude ore	25	106 281		7 018	2 884	
Viola Mac (Sandon)	I. Steenhoff, New Denver	23	Crude ore	64	62 957		13 119	1 359	
Wagner (Hall Creek)	L. Leighton, Nelson	110	Crude ore	31	57 262		13 326	5 279	
Wild Goose (Kaslo)	Timberline Enterprises	4	Crude ore		11 228		2 659	499	
Trail Creek Mining Division									
Golden Drip (Rossland)	Lloyd McLellan, Rossland	.04	Crude ore	1 680					
Vancouver Mining Division									
Warman, Northair (Callaghan Creek)	Northair Mines Ltd.	27 187	Lead concentrates, 820 t; zinc concentrates, 1 178 t; dore bars.	242 931	1 062 806	42 569	424 627	708 143	
Vernon Mining Division									
Nil									
Victoria Mining Division									
Nil									

[1] Estimated.

[2] Produced in 1981.

Table 3-13A—Destination of British Columbia Ore and Concentrates, 1982

Destination	Ore	Gold/ Silver/Copper Concentrates	Copper[1] Concentrates	Lead Concentrates	Zinc Concentrates	Iron Concentrates	Molybdenite Concentrates, Molybdic Trioxides, Ferro-Molybdenum	Tin Concentrates
CANADA	t	t	t	t	t	t	t	t
Trail	1 985	1 629	....	120 629	150 387	....	....	....
Other Canadian	....	1 028	64 699	....	....	100 581[2]	898	....
FOREIGN								
Australia	....	....	....	....	....	72 025	59	....
Brazil	....	....	9 767	....	....	....	....	....
Chile	....	....	....	....	....	....	1 325	....
Germany	....	2	34 524	3 112	....	....	1 873	....
Italy	....	....	....	....	....	....	29	....
Japan	....	16 923	780 220	....	2 255	602 345	4 174	....
Korea	....	....	69 249	....	....	....	....	....
Mexico	....	10 775	....	....	....	....	....	316
Netherlands	....	....	....	....	....	....	4 691	....
Philippines	....	....	....	....	....	....	2	....
Spain	....	....	11	....	....	....	....	....
Taiwan	....	....	24 113	....	....	....	....	....
U.K.	....	50	3 903	....	....	....	85	....
U.S.A.	....	3 350	40 686	....	....	....	2 505	....
Europe (country not specified)	....	12 842	....	....	....	....	8 750	....
Miscellaneous	....	....	....	....	....	....	2 747	....
Totals	1 985	46 599	1 027 172	123 741	152 642	774 951	27 138	316

[1] Includes blister copper.

[2] Includes small amount of coarse iron.

Table 3-13B—Destination of Metals in Ores and Concentrates Shipped from British Columbia Mines—1982
(Showing Metals Paid for and Values)

Country	Gold		Silver		Copper		Lead	
	g	$	g	$	kg	$	kg	$
Canadian Shipments	3 279 739	48 821 939	165 353 955	51 711 342	17 401 040	31 898 132	81 980 286	42 071 463
Foreign Shipments								
Australia	....	....	....	....	....	....	....	....
Brazil	....	....	329 635	101 596	2 570 505	5 381 992	....	....
Chile	....	....	....	....	....	....	....	....
Germany	437 290	6 343 334	2 533 800	785 787	10 401 899	17 803 540	1 766 265	964 124
Italy	....	....	....	....	....	....	....	....
Japan	2 766 436	42 776 800	171 743 944	56 648 977	205 963 981	359 028 985	....	....
Korea	12 852	192 518	2 791 077	586 410	17 425 883	33 838 924	....	....
Mexico	186 554	4 467 701	61 202 031	24 698 461	1 927 550	3 674 903	....	....
Netherlands	....	....	....	....	....	....	....	....
Philippines	....	....	....	....	....	....	....	....
Spain[1]	−2 099	−4 280	−56 101	−10 147	−41 783	−144 089	....	....
Taiwan	144 973	2 304 290	1 042 745	333 840	5 250 701	9 263 739	....	....
U.K.	235 236	4 486 711	1 677 069	580 538	3 857 000	9 711 706	....	....
U.S.A.	349 884	5 327 618	13 538 006	4 632 516	12 940 016	20 968 613	....	....
Europe (not specified)	....	....	....	....	....	....	....	....
Misc. (not specified)	276 650	3 553 319	79 409 416	18 191 000	2 176 807	3 583 354	....	....
Total Foreign	4 407 776	69 448 011	334 211 622	106 548 978	262 472 559	463 111 667	1 766 265	964 124
Total Shipments	7 687 515	118 269 950	499 565 577	158 260 320	279 873 599	495 009 799	83 746 551	43 035 587

Table 3-13B—Destination of Metals in Ores and Concentrates Shipped from British Columbia Mines—1982
(Showing Metals Paid for and Values)

Country	Zinc		Cadmium		Iron		Molybdenum		Tin	
	kg	$	kg	$	t	$	kg	$	kg	$
Canadian Shipments	74 174 634	62 460 234	146 315	281 675	100 581	2 193 061	517 632	7 918 040	....	....
Foreign Shipments										
Australia	....	....	....	....	72 025	2 533 965	35 462	571 318	....	....
Brazil	....	....	....	....	....	....	....	....	....	....
Chile	....	....	....	....	....	....	589 150	4 802 653	....	....
Germany	....	....	....	....	....	....	832 261	5 932 689	....	....
Italy	....	....	....	....	....	....	15 719	229 435	....	....
Japan	1 003 081	1 103 619	1 269	4 512	602 345	14 902 984	1 854 304	27 083 613	....	....
Korea	....	....	....	....	....	....	....	....	....	....
Mexico	....	....	....	....	....	....	....	....	115 261	1 568 666
Netherlands	....	....	....	....	....	....	2 556 679	12 131 900	....	....
Philippines	....	....	....	....	....	....	1 192	26 778	....	....
Spain[1]	....	....	....	....	....	....	....	....	....	....
Taiwan	....	....	....	....	....	....	....	....	....	....
U.K.	....	....	....	....	....	....	21 199	141 255	....	....
U.S.A.	4 984	7 692	22	78	....	....	1 270 612	13 013 998	....	....
Europe (not specified)	....	....	....	....	....	....	4 977 176	60 304 851	....	....
Misc. (not specified)	....	....	....	....	....	....	2 076 502	22 834 440	....	....
Total Foreign	1 008 065	1 111 311	1 291	4 590	674 370	17 436 949	14 230 256	147 072 930	115 261	1 568 666
Total Shipments	75 182 699	63 571 545	147 656	286 265	774 951	19 630 010	14 747 888	154 990 970	115 261	1 568 666

[1] Prior year adjustment.

Table 3-14—Petroleum and Natural Gas, 1954–1982

Year	Crude Oil		Field Condensate		Plant Condensate		Natural Gas to Pipeline		Butane		Propane		Total Value
	m^3	$	m^3	$	m^3	$	10^3m^3	$	m^3	$	m^3	$	
1954	....	....	....	....	....	....	1 715	6 545	....	....	....	....	6 545
1955	93	480	....	....	....	....	4 752	18 130	....	....	....	....	18 610
1956	23 602	299 322	....	....	....	....	5 292	20 143	....	....	....	....	319 465
1957	54 901	763 751	....	....	4 449	no value	233 138	433 830	....	....	....	....	1 197 581
1958	81 675	1 009 609	....	....	39 915	380 072	1 635 204	3 368 327	12 980	26 115	10 985	22 110	4 806 233
1959	137 484	1 573 227	....	....	81 554	367 797	1 817 945	3 928 839	32 916	66 249	15 410	31 016	5 967 128
1960	137 981	1 531 049	....	....	119 377	459 741	2 257 170	7 101 949	46 643	93 878	19 888	40 029	9 226 646
1961	161 462	1 900 104	25	297	129 349	737 761	2 703 776	8 818 891	51 148	102 946	25 928	52 185	11 612 184
1962	1 415 772	16 827 118	1 530	18 184	133 206	674 644	3 062 513	10 226 323	61 618	124 019	34 500	69 438	27 939 726
1963	1 989 747	24 900 381	2 174	27 205	133 828	536 193	2 973 071	10 719 298	65 041	130 908	32 619	65 651	36 379 636
1964	1 832 404	23 396 716	4 192	63 436	146 622	587 685	3 351 574	12 192 816	73 415	147 763	38 921	78 337	36 466 753
1965	2 141 679	28 696 841	5 053	67 696	150 632	576 106	3 910 948	14 493 255	75 996	152 956	57 042	114 808	44 101 662
1966	2 645 259	36 268 683	6 291	86 265	154 946	312 360	4 543 460	17 339 587	79 650	160 311	53 153	106 981	54 274 187
1967	3 125 181	44 748 477	6 450	92 357	161 541	267 941	5 596 092	21 667 136	93 505	188 197	65 672	132 178	67 096 286
1968	3 521 783	50 082 837	8 611	122 408	152 670	247 455	6 317 544	24 531 445	83 870	168 814	63 723	128 256	75 281 215
1969	4 023 815	58 176 213	12 425	180 520	150 104	263 278	7 218 831	27 897 585	66 385	133 613	52 069	104 800	86 756 009
1970	4 032 130	60 405 941	17 052	277 829	159 489	253 009	7 678 940	29 804 411	49 074	98 772	66 828	134 505	90 974 467
1971	3 999 185	66 471 856	17 331	287 781	177 137	293 287	7 685 055	31 946 372	50 590	101 822	74 547	150 040	99 251 158
1972	3 788 849	63 166 717	16 619	277 069	161 854	327 820	9 939 498	41 616 824	54 200	106 533	76 323	150 015	105 644 978
1973	3 368 902	68 306 032	20 114	407 807	180 088	222 463	10 789 269	54 762 105	109 057	212 640	99 188	193 398	124 104 445
1974	3 012 501	103 335 328	16 561	568 075	178 534	924 549	9 016 996	128 018 726	105 426	232 085	89 373	196 742	233 275 505
1975	2 269 898	94 229 725	16 094	668 092	185 272	6 525 837	9 236 489	214 733 528	106 427	2 577 205	81 975	1 985 087	320 719 474
1976	2 367 450	116 595 050	18 309	901 711	167 576	7 198 957	8 799 508	287 997 059	109 781	4 591 832	88 195	3 688 955	420 973 564
1977	2 200 303	132 859 085	24 465	1 477 248	180 267	9 751 058	8 895 663	396 601 354	111 357	5 358 167	91 297	4 392 944	550 439 856
1978	2 004 699	145 005 524	25 386	1 836 217	155 503	10 269 861	8 003 029	401 373 236	106 580	5 932 766	85 732	4 513 447	568 931 051
1979	2 139 963	168 928 671	32 549	2 569 418	184 398	13 396 500	11 392 641	699 508 127	112 683	7 122 711	84 864	4 851 698	896 377 125
1980	2 002 128	189 561 479	36 855	3 489 431	133 601	11 641 991	8 931 833	612 545 107	89 556	6 491 914	75 507	4 572 704	828 302 626
1981	2 035 953	236 170 548	27 871	3 233 036	124 946	13 284 259	8 062 681	616 795 096	84 635	9 953 076	64 118	5 080 069	884 516 084
1982	2 078 258	333 892 930	20 771	3 337 069	135 185	19 765 399	7 188 561	542 664 470	89 443	9 436 236	68 783	3 806 451	912 882 555
Totals	56 593 057	2 069 103 694	336 728	19 989 151	3 682 043	99 266 023	161 253 788	4 221 130 514	1 921 976	53 711 528	1 516 640	34 661 844	6 497 862 754

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